Evaluation of Haematological Parameters in Dengue Fever: A Hospital-Based Study

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Abstract
Background: Dengue fever is a major arboviral infection in tropical and subtropical regions, and derangement of haematological parameters is central to its clinical course and prognosis.
Objective: To evaluate the pattern of haematological parameters in serologically confirmed dengue patients and to assess their relationship with disease severity.
Methods: A hospital-based descriptive study was conducted on 180 confirmed dengue patients over a six-month period. Complete blood counts were analysed using an automated haematology analyser, and parameters were correlated with the presence of warning signs.
Results: The mean age was 28.6 ± 13.2 years with a male predominance (61.1%). Thrombocytopenia was the most frequent abnormality (78.3%), followed by leukopenia (47.8%) and atypical lymphocytes (37.8%). The mean platelet count fell to a nadir of 65 $\times 10^3/\mu L$ around the sixth day of illness. Severe thrombocytopenia (<50 $\times 10^3/\mu L$) and raised haematocrit were significantly associated with warning signs ($p < 0.05$).
Conclusion: Serial monitoring of platelet count and haematocrit provides a simple, cost-effective tool for early risk stratification and timely management of dengue fever.

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Keywords: Dengue fever, Thrombocytopenia, Leukopenia, Haematocrit, Haematological parameters, NS1 antigen

1. Introduction

Dengue fever is an acute mosquito-borne viral illness caused by the dengue virus (DENV-1 to DENV-4), transmitted primarily by *Aedes aegypti* and *Aedes albopictus*. It is among the most rapidly spreading arboviral diseases worldwide, with an estimated 100–400 million infections each year, the majority occurring in tropical and subtropical regions including the Indian subcontinent [1,2]. The clinical spectrum ranges from a self-limiting febrile illness to severe forms characterised by plasma leakage, haemorrhage and shock [3].

Haematological alterations are a hallmark of dengue infection and frequently precede overt clinical deterioration. Thrombocytopenia, leukopenia, haemoconcentration and atypical lymphocytosis reflect the underlying pathophysiology of bone-marrow suppression, immune-mediated platelet destruction and increased vascular permeability [4,5]. Because these changes can be detected early through a simple complete blood count, haematological monitoring serves as an accessible and inexpensive tool for assessing disease progression in resource-limited settings [6].

Despite the availability of serological confirmation through NS1 antigen and IgM/IgG antibody testing, the complete blood count remains indispensable for day-to-day management and triage [7]. The present hospital-based study was therefore undertaken to evaluate the pattern of haematological parameters in confirmed dengue patients and to examine their association
with clinical warning signs, with the aim of supporting early risk stratification.

2. Methodology

- **Study design and setting:** This was a hospital-based descriptive observational study conducted in the Department of Pathology of a tertiary-care teaching hospital over a six-month period (July to December 2025), coinciding with the post-monsoon dengue transmission season.
- **Study population:** A total of 180 patients of either sex with serologically confirmed dengue infection were included. Confirmation was based on a positive NS1 antigen test and/or dengue-specific IgM antibody by ELISA. Patients with other concurrent febrile illnesses (malaria, enteric fever, sepsis), pre-existing haematological disorders, chronic liver disease or those on anticoagulant/antiplatelet therapy were excluded to avoid confounding.
- **Data collection:** Demographic details, day of illness at presentation and clinical findings were recorded using a structured proforma. Venous blood samples collected in EDTA vacutainers were analysed on a five-part automated haematology analyser. Parameters studied included haemoglobin, haematocrit, total leukocyte count, differential count and platelet count.
- Thrombocytopenia was defined as a platelet count <150 $\times 10^3/\mu L$ and graded as mild (100–150), moderate (50–99) or severe (<50). Leukopenia was defined as a total leukocyte count <4.0 $\times 10^3/\mu L$. Warning signs were identified according to the WHO 2009 classification.
- **Statistical analysis:** Data were compiled in a spreadsheet and analysed using standard statistical software. Continuous variables were expressed as mean ± standard deviation and categorical variables as frequencies and percentages. The chi-square test was used to assess associations between haematological abnormalities and warning signs; a p-value <0.05 was considered statistically significant. Institutional ethics committee approval and informed consent were obtained.

3. Results

Of the 180 confirmed dengue patients, 110 (61.1%) were male and 70 (38.9%) were female, giving a male-to-female ratio of 1.57:1. The mean age was 28.6 ± 13.2 years, with the largest proportion in the 21–30-year age group. NS1 antigen was positive in 124 (68.9%) patients and dengue IgM in 92 (51.1%). Baseline characteristics are summarised in Table 1.

Table 1: Demographic and baseline characteristics of the study population (n = 180).

Characteristic	Value
Mean age (years)	28.6 ± 13.2
Male, n (%)	110 (61.1)
Female, n (%)	70 (38.9)
Male:Female ratio	1.57 : 1
Commonest age group	21–30 years (38.3%)
NS1 antigen positive, n (%)	124 (68.9)
Dengue IgM positive, n (%)	92 (51.1)
Mean day of illness at presentation	4.3 ± 1.6

The mean values of the major haematological parameters and the frequency of their derangements are presented in Table 2. Thrombocytopenia was the most common abnormality, observed in 141 (78.3%) patients, followed by leukopenia in 86 (47.8%) and atypical lymphocytes in 68 (37.8%). A raised haematocrit suggestive of haemoconcentration was noted in 54 (30.0%) patients.

Table 2: Mean haematological parameters and frequency of abnormalities.

Parameter	Mean ± SD	Abnormality (n, %)
Haemoglobin (g/dL)	13.4 ± 2.0	Anaemia: 22 (12.2)
Haematocrit (%)	41.8 ± 6.5	Raised: 54 (30.0)
Total leukocyte count ($\times 10^3/\mu L$)	4.9 ± 2.6	Leukopenia: 86 (47.8)
Platelet count ($\times 10^3/\mu L$)	92 ± 58	Thrombocytopenia: 141 (78.3)
Lymphocytes (%)	38.5 ± 11.2	Atypical: 68 (37.8)

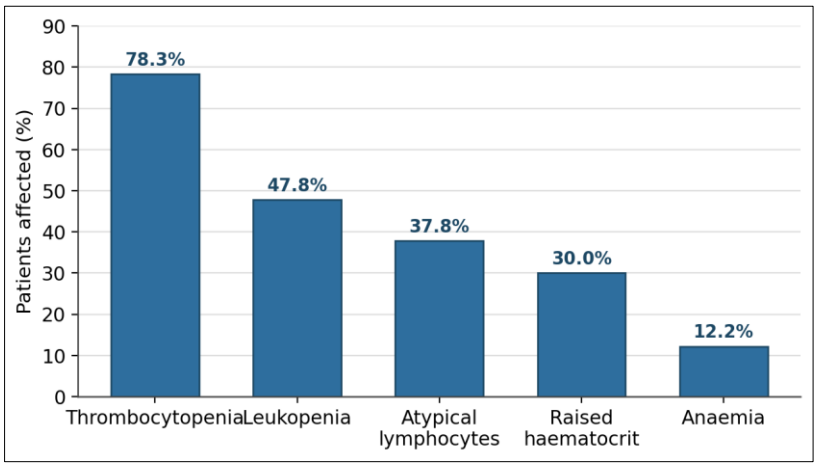

Fig 1: Frequency of haematological abnormalities among dengue patients (%).

Among the 141 patients with thrombocytopenia, moderate thrombocytopenia was the most frequent grade (43.3%), while severe thrombocytopenia (<50 ×10³/µL) was present in 36 (25.5%) patients. The distribution of severity grades and association with warning signs is shown in Table 3. Severe thrombocytopenia and raised haematocrit were both significantly associated with the presence of warning signs ($p < 0.05$).

Table 3: Severity grading of thrombocytopenia and association with warning signs (n = 141).

Severity (platelet ×10³/µL)	n (%)	With warning signs, n (%)
Mild (100–150)	44 (31.2)	6 (13.6)
Moderate (50–99)	61 (43.3)	19 (31.1)
Severe (<50)	36 (25.5)	24 (66.7)
Total	141 (100)	49 (34.8)

Serial platelet counts by day of illness showed a progressive decline reaching a nadir around the sixth day, followed by spontaneous recovery during convalescence, as illustrated in Figure 2. This pattern underscores the importance of timing when interpreting a single platelet value.

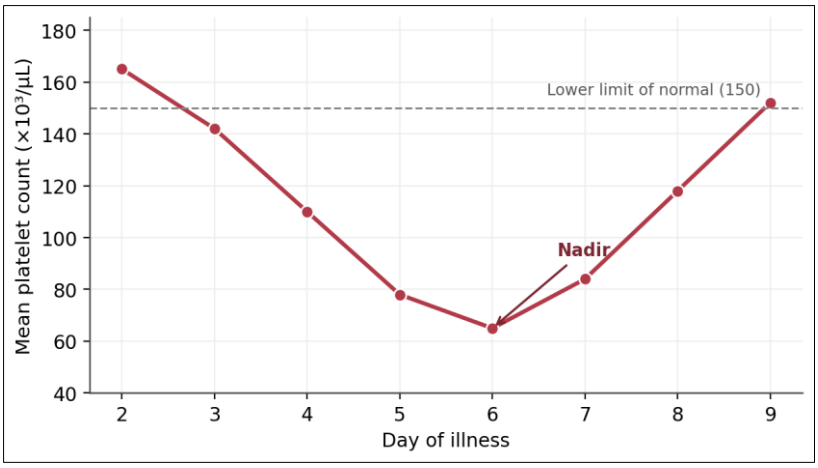

Fig 2: Mean platelet count by day of illness showing the characteristic nadir and recovery.

4. Discussion

The present study confirms that haematological derangements are a consistent and clinically meaningful feature of dengue infection. The male predominance (61.1%) and the clustering of cases in the second and third decades of life are in keeping with previous Indian reports, likely reflecting greater outdoor exposure among young adult males rather than any true biological susceptibility [8,9].

Thrombocytopenia emerged as the most frequent abnormality, affecting 78.3% of patients, a finding consistent with the wide range of 60–90% reported across the literature [10,11]. The pathogenesis is multifactorial, involving direct viral suppression of megakaryopoiesis, immune-mediated peripheral destruction of platelets and platelet sequestration [12]. Importantly, the characteristic fall in platelet count to a nadir around the sixth day of illness, followed by recovery, highlights that a single low value must be interpreted in the context of the day of illness rather than in isolation [13].

Leukopenia (47.8%) and atypical lymphocytosis (37.8%) reflect the marrow-suppressive and immune-activating effects of the virus and may point to the diagnosis even before serological confirmation [5,6]. The significant association of raised haematocrit and severe thrombocytopenia with warning signs reinforces the role of haemoconcentration as a

marker of plasma leakage and impending severe disease [3,14]. Being simple and rapidly available, these parameters are particularly valuable for triage in resource-limited settings.

The strength of this study lies in its reliance on routinely available, low-cost investigations that are easily replicated in peripheral hospitals. Its limitations include a single-centre design, modest sample size and the absence of serial day-wise sampling for every patient. Larger multicentric studies with serial monitoring and outcome correlation would further strengthen these observations [15].

5. Conclusion

Haematological parameters, particularly platelet count and haematocrit, are reliable, inexpensive and widely accessible indicators of disease activity in dengue fever. Thrombocytopenia is the most common abnormality, while severe thrombocytopenia and haemoconcentration correlate with clinical warning signs. Serial monitoring of the complete blood count, interpreted in relation to the day of illness, enables early identification of patients at risk of progression and supports timely intervention, thereby contributing to reduced morbidity and mortality.

References

1. World Health Organization. Dengue and severe dengue. Geneva: WHO; 2024.
2. Bhatt S, Gething PW, Brady OJ, Messina JP, Farlow AW, Moyes CL, *et al*. The global distribution and burden of dengue. Nature. 2013;496(7446):504–7.
3. World Health Organization. Dengue: guidelines for diagnosis, treatment, prevention and control. Geneva: WHO; 2009.
4. Jameel T, Mehmood K, Mujtaba G, Choudhry N, Afzal N, Paul RF. Changing haematological parameters in dengue viral infections. J Ayub Med Coll Abbottabad. 2012;24(1):3–6.
5. Chaloemwong J, Tantiworawit A, Rattanathammethee T, Hantrakool S, Chai-Adisaksopha C, Rattarittamrong E, *et al*. Useful clinical features and haematological parameters for the diagnosis of dengue infection. BMC Hematol. 2018;18:20.
6. Kulkarni RD, Patil SS, Ajantha GS, Upadhya AK, Kalabhavi AS, Shubhada C, *et al*. Association of platelet count and serological markers of dengue infection. Indian J Med Microbiol. 2011;29(4):359–62.
7. Hunsperger EA, Yoksan S, Buchy P, Nguyen VC, Sekaran SD, Enria DA, *et al*. Evaluation of commercially available diagnostic tests for the detection of dengue NS1 antigen and anti-dengue antibodies. PLoS Negl Trop Dis. 2014;8(10):e3171.
8. Mahmood S, Hafeez S, Nabeel H, Zahra U, Nazeer H. Does comorbidity increase the risk of dengue haemorrhagic fever and dengue shock syndrome? ISRN Trop Med. 2013;2013:139273.
9. Ageep AK, Malik AA, Elkarsani MS. Clinical presentations and laboratory findings in suspected cases of dengue virus. Saudi Med J. 2006;27(11):1711–3.
10. Khan DM, Kuppusamy K, Sumathi S, Mrinalini VR. Haematological profile of dengue fever. Int J Curr Microbiol Appl Sci. 2014;3(1):24–30.
11. Azin FR, Gonalves RP, Pitombeira MH, Lima DM, Branco IC. Dengue: profile of haematological and biochemical dynamics. Rev Bras Hematol Hemoter. 2012;34(1):36–41.
12. Srichaikul T, Nimmannitya S. Haematology in dengue and dengue haemorrhagic fever. Baillieres Best Pract Res Clin Haematol. 2000;13(2):261–76.
13. Potts JA, Rothman AL. Clinical and laboratory features that distinguish dengue from other febrile illnesses in endemic populations. Trop Med Int Health. 2008;13(11):1328–40.
14. Gupta E, Ballani N. Current perspectives on the spread of dengue in India. Infect Drug Resist. 2014;7:337–42.
15. Ralapanawa U, Alawattegama AT, Gunrathne M, Tennakoon S, Kularatne SA, Jayalath T. Value of peripheral blood count for dengue severity prediction: a cross-sectional study. BMC Res Notes. 2018;11:400.

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