

# CORRELATION OF RETICULOCYTE COUNT AND IMMATURE PLATELET FRACTION WITH PLATELET RECOVERY IN DENGUE PATIENTS WITH THROMBOCYTOPENIA

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## ABSTRACT

**Background:** Dengue fever commonly presents with thrombocytopenia due to transient bone marrow suppression. Monitoring platelet recovery is important for clinical management. Immature platelet fraction (IPF) and reticulocyte count may reflect bone marrow activity and help predict platelet recovery in dengue patients.

**Objectives:** To measure reticulocyte count and immature platelet fraction in dengue patients with thrombocytopenia and to determine their correlation with platelet recovery during the course of illness.

**Methodology:** A prospective observational study was conducted among 68 dengue patients admitted to the Department of Medicine at D.Y. Patil Hospital and Research Centre, Kolhapur. Adults with dengue NS1 antigen or IgM positivity and platelet count  $<150,000$  cells/cmm were included. Complete blood count, immature platelet fraction, and reticulocyte count were measured on admission and repeated on days 2 and 4. Platelet counts were monitored until recovery. Statistical analysis was performed using SPSS version 23.

**Results:** Among 68 patients, the highest proportion belonged to the 18–29 years age group (30%), followed by 45–59 years (27.5%), while 17.5% were aged 60–74 years. Males constituted 70% of the study population. The mean immature platelet fraction (IPF%) at admission was  $9.5 \pm 4.0$ , which increased to a peak value of  $12.0 \pm 4.5$  during hospitalization. Serial measurements demonstrated a progressive rise in IPF% from day 0 ( $9.0 \pm 4.0$ ) to day 4 ( $12.0 \pm 4.5$ ). In contrast, mean platelet counts initially declined from  $30.0 \pm 10.0 \times 10^9/L$  on day 0 to  $25.0 \pm 9.0 \times 10^9/L$  on day 2, followed by an increase to  $35.0 \pm 12.0 \times 10^9/L$  on day 4. These findings indicate that rising IPF% preceded platelet recovery, suggesting enhanced thrombopoietic activity.

**Conclusion:** Immature platelet fraction increases before platelet recovery in dengue patients with thrombocytopenia, indicating bone marrow regeneration. Serial monitoring of IPF may serve as a useful early marker for predicting platelet recovery and guiding clinical management.

**Keywords:** Thrombocytopenia, Immature Platelet Fraction (IPF), Reticulocyte Count, Platelet Recovery, Bone Marrow Suppression

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**Conflict of interest:** None

## INTRODUCTION

Dengue fever is caused by Dengue Virus (DENV), a flavivirus, spread by Aedes mosquitoes, and because there are four different DENV serotypes, individual can get infected up to four times <sup>(1)</sup>. It is a systemic, dynamic disease with shifting clinical and laboratory parameters from day to day. The clinical spectrum can range from a mild febrile illness to a life-threatening haemorrhagic fever and shock syndrome. The main haematological abnormalities are leukopenia and thrombocytopenia <sup>(2)</sup>. Thrombocytopenia is a common symptom of moderate and severe dengue sickness, and linked to the severity of disease <sup>(3)</sup>. (Sy)

DENV-associated thrombocytopenia has been linked to a variety of mechanisms, including bone marrow suppression and peripheral platelet destruction. Studies have shown that DENV-infected haematopoietic progenitors or bone marrow stromal cells lead to suppressing haematopoiesis, and anti-platelet antibodies is a cause of premature destruction of platelets in the peripheral circulation <sup>(4)</sup>. Excessive bleeding is one of the clinical signs of severe dengue, and it is responsible for a significant number of fatalities, even though it is relatively uncommon compared to plasma leakage.

The exact pathophysiological process of haemostatic including severe thrombocytopenia, prolonged coagulation

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profiles, reduced coagulation factors, abnormal fibrinolysis and reduced natural anticoagulant had been reported in dengue patients, and most of this derangement will normalise on its own without causing any clinically significant bleeding<sup>(5)</sup>.

Dengue patients with thrombocytopenia used to be treated with platelet transfusion either as prophylaxis or therapeutic approach because thrombocytopenia is a common laboratory finding and thought to be an important cause of bleeding. It was well documented that transfusion is associated with risk of an allergic reaction, sensitisation of alloantibody, pulmonary complications and transmitting blood-borne infectious diseases<sup>(6)</sup>. Moreover, the development of severe bleeding in dengue is not prevented by platelet transfusion nor does it shorten the bleeding<sup>(7)</sup>. A recent study showed that prophylactic platelet transfusion was not superior to supportive care in preventing bleeding in adult dengue patients with thrombocytopenia, and it may be associated with side effects. As more evidence emerged against this practice<sup>(7)</sup> prophylactic platelet transfusion has become less common and is currently not routinely recommended in dengue management.

The recovery from transient marrow suppression in dengue fever will usually occur within 10 days after infection even though the thrombocytopenia persists. Immature platelets are released into the peripheral bloodstream and mature within 24 hours during marrow recovery. Their presence in the blood can be used as a marker indicating bone marrow activity<sup>(8)</sup>.

Immature platelets are young and reticulated because they contain higher ribonucleic acid (RNA) than mature platelets and larger in size. They take up dyes more readily and this principle is used in modern haematology analysers to measure immature platelets in peripheral blood<sup>(9)</sup>. Immature platelet fraction (IPF) is measured as a percentage of the immature platelet over the total platelet population. Both absolute and percentage of IPF have been used in various researches related to thrombocytopenia. Data has shown IPF is able to predict platelet recovery faster than the increment of platelet count and this is useful in the management of dengue particularly when the decision of platelet transfusion need to be made<sup>(10)</sup>.

The present stud will be conducted to find if there is any correlation between Reticulocyte Count and Immature Platelet Fraction with Platelet Recovery in Dengue Patients with Thrombocytopenia. We will also find out if Reticulocyte Count is a reliable marker to predict Platelet Recovery in Dengue Patients with Thrombocytopenia.

### METHODOLOGY

The Prospective Observational Study conducted on Dengue cases at OPD & IPD of Department of Medicine in D.Y. Patil Hospital & Research Centre, Kolhapur. Study conducted for o duration of 24 months. Study subjects were selected fulfilling the exclusion and inclusion criteria. The sample size was 68.

**Inclusion Criteria** All genders above age of 18 years, Patient tested positive for either dengue antigen NS1 and/or IGM, Platelet count < 150,000 cells/cmm, Dengue grade 1 and 2 according to WHO Classification of Grades of Dengue Fever, Patients who give informed valid consent

**Exclusion Criteria** Chronic moderate to severe anemia, Patients with Uremia, Known case of Platelet disorder, Patients on any drugs and medications that affect platelet count, Patients that transfer out before study is complete

The Study was started after getting approval of Institutional Ethics Committee

Patients who admitted in ward of D. Y. Patil Hospital who test positive for Dengue NS1 or IgM was considered for the study.

After enrollment, informed consent of every patient was taken.

Baseline demographic and clinical data of every enrolled patient was collected in pre-designed proforma.

On Day 0 that is day of admission proper history of the patient will be taken, and complete blood count was done along with Immature Platelet Fraction and Reticulocyte Count.

Patients whose platelet drop below 150,000 was considered further for the study,

Complete blood count for platelet count, immature platelet fraction, reticulocyte count was repeated on days 2,4 to obtain data and Platelet Counts was done on day 5,6,7Correlation between Reticulocyte count and Immature Platelet Fraction with Platelet recovery was assessed.

Note- Platelet Recovery was considered with Platelet counts of > 150,000 cells/ml for the purpose of this study.

### RESULTS

**Table 1. Age Distribution of the Patients**

Age Group	Frequency	Percent
18 to 30 Years	19	27.9
31 to 40 Years	17	25.0
41 to 50 Years	18	26.5
51 to 60 Years	11	16.2
> 60 Years	3	4.4

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Total	68	100.0
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The majority of patients were in the 18-30years age group (27.9%), followed closely by 41-50 years (26.5%) and 31-40 years (25.0%). Patients aged 51-60 years constituted 16.2%, while those above 60 years were only 4.4% of the study population. The study population predominantly consisted of young to middle-aged adults.

**Table 2. Gender Distribution of the Patients**

Gender	Frequency	Percent
Male	37	54.4
Female	31	45.6
Total	68	100.0

Out of 68 patients, 37 (54.4%) were males and 31 (45.6%) were females, showing a slight male predominance. Dengue with thrombocytopenia was marginally more common in males in this cohort.

**Table 3. Presenting Symptoms of the Patients**

Presenting Symptoms	Frequency	Percent
Fever	26	38.2
Fever , Vomiting	13	19.1
Fever with Rash	15	22.1
Fever, Headache	14	20.6
Total	68	100.0

The most common presentation was fever alone (38.2%), followed by fever with rash (22.1%), fever with headache (20.6%), and fever with vomiting (19.1%). Fever was a universal symptom, with variable associated clinical features typical of dengue infection.

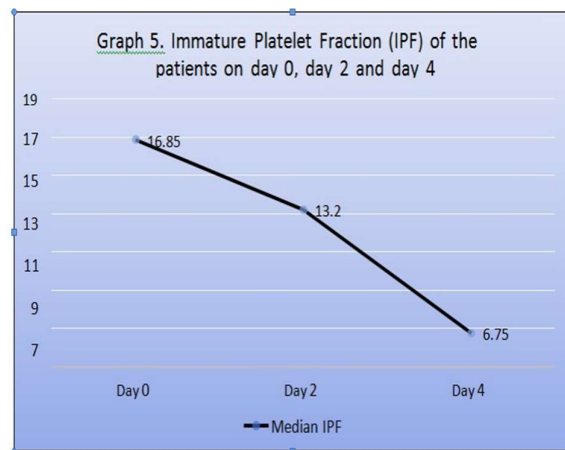
**Table 4. Dengue NS1 and IgM Positivity of the Patients**

Dengue NS1 and IgM Positivity		Frequency	Percent
Dengue NS1	Positive	45	66.2
	Negative	23	33.8
Dengue IgM	Positive	45	66.2
	Negative	23	33.8
Total		68	100.0

Among the total cases, 45 patients (66.2%) tested NS1 positive for dengue, while 23 (33.8%) were NS1 negative. 45 patients (66.2%) tested Dengue IgM positive, while 23 (33.8%) were Dengue IgM Negative.

**Table 5. Immature Platelet Fraction (IPF) of the patients on day 0, day 2 and day 4**

Timeline	Median IPF	IQR
Day 0	16.850	15.8
Day 2	13.200	9.6
Day 4	6.750	17.8



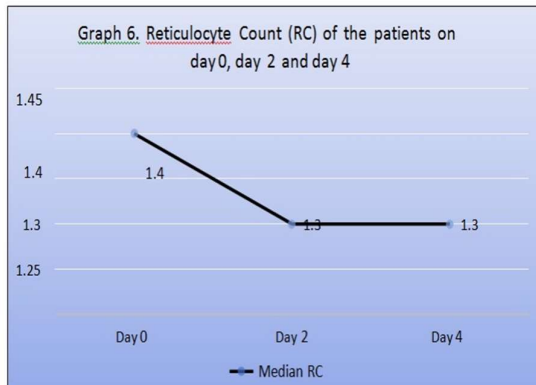
The median IPF decreased progressively from 16.85 (IQR 15.8) on Day 0 to 13.2 (IQR 9.6) on Day 2, and further to 6.75 (IQR 17.8) on Day 4. The declining trend in IPF suggests increased platelet production initially, followed by normalization as platelet recovery occurs.

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**Table 6. Reticulocyte Count (RC) of the patients on day 0, day 2 and day 4**

Timeline	Median RC	IQR
Day 0	1.40	1.5
Day 2	1.30	1.5
Day 4	1.30	1.7

The median reticulocyte count was 1.40 (IQR 1.5) on Day 0, which slightly decreased to 1.30 (IQR 1.5) on Day 2 and remained 1.30 (IQR 1.7) on Day 4. Reticulocyte count remained relatively stable, indicating minimal association with platelet dynamics.

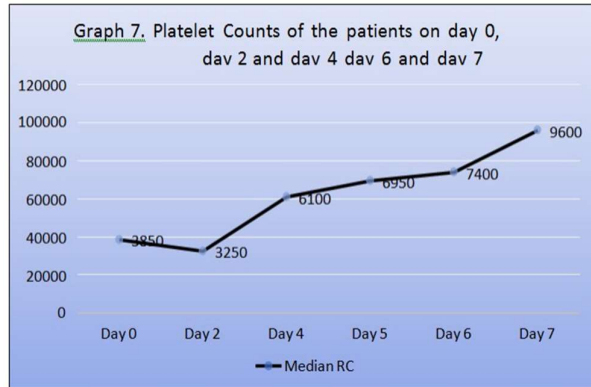


**Table 7. Platelet Counts of the patients on day 0, day 2 and day 4 day 6 and day 7**

Timeline	Median RC	IQR
Day 0	38500.0	114000.0
Day 2	32500.0	105000.0
Day 4	61000.0	121000.0
Day 5	69500.0	150000.0
Day 6	74000.0	141000.0
Day 7	96000.0	132000.0

The median platelet count initially decreased from

38,500/ $\mu$ L (IQR 114,000) on Day 0 to 32,500/ $\mu$ L (IQR 105,000) on Day 2, followed by a steady rise to 61,000/ $\mu$ L on Day 4, 69,500/ $\mu$ L on Day 5, 74,000/ $\mu$ L on Day 6, and 96,000/ $\mu$ L on Day 7. Platelet nadir occurred around Day 2, followed by gradual recovery, consistent with the natural course of dengue.



**Table 8. Correlation between Immature Platelet Fraction and Platelet Counts on different days**

Immature Platelet Fraction (%)		Platelet Counts ( $\mu$ L)		
		Day 0	Day 2	Day 4
Day 0	Pearson Correlation	-0.118	-0.120	0.200
	P value	0.340	0.331	0.102
Day 2	Pearson Correlation	0.082	0.145	0.147
	P value	0.506	0.239	0.231
Day 4	Pearson Correlation	0.346**	0.368**	0.357**
	P value	0.004	0.002	0.002

On Day 0 and Day 2, IPF showed no significant correlation with platelet counts ( $p > 0.05$ ). However, on Day 4, there was a moderate positive correlation between IPF and platelet counts ( $r = 0.346, 0.368, 0.357$  across comparisons), which was statistically significant ( $p = 0.004, 0.002, 0.002$ ). IPF becomes a significant predictor of platelet recovery during the recovery phase (Day 4).

**Table 9. Correlation between Reticulocyte Count and Platelet Counts on different days**

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Reticulocyte Count (%)		Platelet Counts ( $\mu\text{L}$ )		
		Day 0	Day 2	Day 4
Day 0	Pearson Correlation	0.018	0.079	0.026
	P value	0.884	0.524	0.836
Day 2	Pearson Correlation	-0.056	-0.053	0.146
	P value	0.652	0.670	0.234
Day 4	Pearson Correlation	-0.030	-0.031	-0.109
	P value	0.807	0.799	0.375

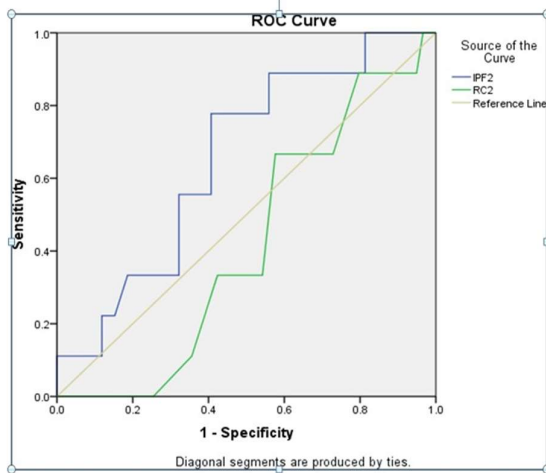
IPF	0.653	0.088	<b>0.040</b>	0.482	0.825
RC	0.417	0.083	0.426	0.255	0.579

Variables	Cut off	Sensitivity	Specificity
Immature Platelet Fraction	14.1	77.8%	59.3%
Reticulocyte Count	1.15	66.7%	42.4%

Across Day 0, Day 2, and Day 4, reticulocyte count showed no significant correlation with platelet counts, with all p values > 0.05 and weak correlation coefficients. Reticulocyte count does not correlate with platelet recovery and is not a useful predictor.

The Area Under Curve (AUC) for IPF was 0.653 ( $\pm 0.088$ ), which was statistically significant ( $p = 0.040$ ), indicating moderate predictive ability. In contrast, the AUC for reticulocyte count was 0.417 ( $\pm 0.083$ ), not statistically significant ( $p = 0.426$ ). At a cutoff of IPF = 14.1, sensitivity was 77.8% and specificity 59.3%, whereas for RC = 1.15, sensitivity was 66.7% and specificity 42.4%. IPF is a moderately reliable predictor of platelet recovery, whereas reticulocyte count has poor predictive value.

**Graph 10. ROC Curve for prediction of Platelet Recovery by Immature Platelet Fraction and Reticulocyte Count**



**Table 10. Area Under the Curve**

Test Result Variable(s)	AUC	Std. Error <sup>a</sup>	P value	Asymptotic 95% CI	
				Lower Bound	Upper Bound

**DISCUSSION**

**Age Distribution of the Patients:**

In the present study, the majority of patients belonged to the 18–30 years age group (27.9%), followed by 41–50 years (26.5%) and 31–40 years (25.0%), indicating a predominance of young to middle-aged adults. Garg A et al. (2011) reported that 16–30 years constituted a significant proportion of dengue cases, highlighting increased exposure risk in this demographic. Similarly, Yasuda I et al. (2021) observed a higher prevalence among adults in the third and fourth decades of life, reflecting occupational exposure and urban transmission dynamics. Looi KW et al. (2021) also demonstrated that adult populations constituted the majority of hospitalized dengue cases in endemic regions, emphasizing repeated exposure and secondary infections. In contrast, Ong-Misa MMS et al. (2018) reported exclusively pediatric cases, reflecting regional demographic variations and healthcare-seeking patterns.

**Gender Distribution of the Patients:**

The present study demonstrated a slight male predominance (54.4% males vs. 45.6% females). Similar findings were reported by Garg A et al. (2011) and Wayez A et al. (2020), who documented male predominance of approximately 60% and 62%, respectively, attributing this to increased outdoor exposure and occupational risk factors. Mangshetty R et al. (2023) showed an almost equal gender distribution in pediatric populations, while

Yasuda I et al. (2021) found no significant difference between genders. The slight male predominance observed in the present study likely reflects environmental and social determinants rather than biological susceptibility.

#### **Presenting Symptoms of the Patients:**

Fever was the most common presenting symptom (38.2%), followed by fever with rash (22.1%), fever with headache (20.6%), and fever with vomiting (19.1%). This pattern is consistent with classical dengue presentations reported by Mangshetty R et al. (2023), who observed fever in nearly all patients, with headache and rash occurring frequently. Looi KW et al. (2021) also documented fever as a universal symptom, accompanied by headache, myalgia, and rash. Kulkarni RD et al. (2011) highlighted the association of thrombocytopenia with systemic manifestations such as vomiting and rash, particularly in NS1-positive cases.

#### **Dengue Positivity of the Patients:**

All patients in the present study were dengue positive; 45 patients (66.2%) were NS1 positive and 45 patients (66.2%) were Dengue IgM positive. Kulkarni RD et al. (2011) demonstrated a significant association between thrombocytopenia and dengue positivity, particularly in NS1-positive cases. Garg A et al. (2011) reported a lower positivity rate of 19.7% among suspected cases, likely due to broader inclusion criteria. Hospital-based studies such as Yasuda I et al. (2021) reported higher confirmation rates and emphasized the diagnostic utility of additional hematological markers such as IPF.

#### **Haemoglobin and Total Leucocyte Count of the Patients:**

The mean haemoglobin levels were comparable between dengue-positive and dengue-negative patients ( $14.26 \pm 0.70$  g/dL vs.  $14.27 \pm 0.74$  g/dL;  $p=0.939$ ). Total leukocyte counts also showed no significant difference ( $p=0.508$ ). Looi KW et al. (2021) and Mangshetty R et al. (2023) reported that leukocyte counts vary according to disease phase, with leukopenia being more common during the critical stage. Yasuda I et al. (2021) similarly found that conventional parameters such as Hb and TLC did not significantly differentiate dengue from other febrile illnesses, highlighting the need for more specific markers like IPF. The absence of significant Hb changes suggests that severe hemoconcentration was not prominent in the present cohort.

#### **Immature Platelet Fraction (IPF):**

The median IPF declined progressively from 16.85 on Day 0 to 13.2 on Day 2 and 6.75 on Day 4, indicating an early increase in thrombopoietic activity followed by normalization with platelet recovery. Yasuda I et al. (2021) reported significantly elevated IPF during the critical phase of dengue before declining during recovery. Ahmad J et al. (2021) observed a median peak IPF of 12.15%, while Looi KW et al. (2021) demonstrated that IPF remains elevated several days before platelet recovery. Wayez A et al. (2020) also noted that elevated IPF reflects

increased bone marrow activity in response to peripheral platelet destruction. The decline in IPF by Day 4 in the present study likely indicates restoration of platelet counts and reduced marrow stimulation.

#### **Reticulocyte Count(RC):**

Median reticulocyte counts remained relatively stable, decreasing slightly from 1.40 on Day 0 to 1.30 on Day 2 and remaining unchanged on Day 4. Jeon K et al. (2020) demonstrated that platelet recovery is primarily associated with thrombopoietic markers rather than erythroid indices. Similar observations were reported by Ong-Misa MMS et al. (2018) and Looi KW et al. (2021), who found immature platelet indices to be more sensitive indicators of marrow recovery. These findings suggest that reticulocyte count has limited clinical utility in monitoring dengue-associated thrombocytopenia.

#### **Platelet Counts:**

The present study demonstrated a typical biphasic platelet pattern, declining from  $38,500/\mu\text{L}$  on Day 0 to a nadir of  $32,500/\mu\text{L}$  on Day 2, followed by recovery to  $96,000/\mu\text{L}$  by Day 7. Similar trends were reported by Looi KW et al. (2021), Ahmad J et al. (2021), and Mangshetty R et al. (2023), who documented platelet recovery within 7–10 days of illness. Kulkarni RD et al. (2011) attributed thrombocytopenia to both bone marrow suppression and peripheral platelet destruction. The gradual rise in platelet count from Day 4 onwards corresponded with declining IPF values, suggesting that peak thrombopoietic activity precedes platelet recovery.

#### **Correlation between IPF and Platelet Counts:**

IPF showed no significant correlation with platelet counts on Day 0 and Day 2; however, a statistically significant moderate positive correlation was observed on Day 4 ( $r = 0.346-0.368$ ,  $p < 0.01$ ). Similar findings were reported by Looi KW et al. (2021), Ahmad J et al. (2021), and Ong-Misa MMS et al. (2018), who demonstrated that elevated IPF precedes platelet recovery and correlates with subsequent platelet increases. Yasuda I et al. (2021) and Wayez A et al. (2020) emphasized that IPF reflects thrombopoietic activity rather than absolute platelet counts. The absence of correlation during the early phase may be due to ongoing platelet destruction and marrow suppression.

#### **Correlation between Reticulocyte Count and Platelet Counts:**

No significant correlation was observed between reticulocyte count and platelet counts at any time point. Jeon K et al. (2020) demonstrated that platelet recovery is linked to thrombopoietic markers rather than erythropoietic indices. Similarly, Ong-Misa MMS et al. (2018) identified IPF as a reliable predictor of platelet recovery. Since dengue primarily affects megakaryocytes and platelet survival, erythroid lineage activity remains relatively unaffected, explaining the lack of association.

#### **ROC Curve for Prediction of Platelet Recovery by IPF and RC:**

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ROC analysis demonstrated that IPF had a statistically significant AUC of 0.653 ( $p = 0.040$ ), indicating moderate predictive ability, whereas reticulocyte count had an AUC of 0.417 ( $p = 0.426$ ), indicating poor predictive value. At a cutoff of 14.1, IPF showed sensitivity of 77.8% and specificity of 59.3%, while reticulocyte count at 1.15 demonstrated lower sensitivity (66.7%) and specificity (42.4%). Ahmad J et al. (2021) reported an IPF cutoff of 10.55% with sensitivity of 69% and specificity of 67%, while Ong-Misa MMS et al. (2018) identified a cutoff of 6.6% with sensitivity of 45% and specificity of 70%. Jeon K et al. (2020) also reported superior diagnostic accuracy of IPF compared with other platelet indices. Although the predictive accuracy was moderate, the high sensitivity suggests that IPF is useful for identifying patients likely to experience platelet recovery.

Overall, the present study provides evidence supporting IPF as a dynamic and reliable marker of platelet recovery in dengue-associated thrombocytopenia. The progressive decline in IPF, significant correlation with platelet counts during recovery, and moderate predictive accuracy highlight its clinical utility. In contrast, reticulocyte count remained stable, showed no significant correlation with platelet dynamics, and demonstrated poor predictive performance, limiting its role in dengue management.

### CONCLUSION

The present study demonstrates that Immature Platelet Fraction (IPF) has a significant correlation with platelet recovery in dengue patients with thrombocytopenia, whereas reticulocyte count does not show any meaningful association with platelet recovery. The study population mainly consists of young and middle-aged adults with a slight male predominance. Fever remains the most common presenting symptom, and most patients show positivity for Dengue NS1 antigen and Dengue IgM antibodies.

Serial monitoring of platelet counts reveals an initial decline with platelet nadir around Day 2, followed by gradual recovery from Day 4 onwards, reflecting the typical course of dengue infection. IPF levels show a progressive decline during the recovery phase and demonstrate a statistically significant positive correlation with platelet counts on Day 4. These findings indicate that increased IPF reflects active bone marrow response and platelet regeneration during recovery from thrombocytopenia.

ROC curve analysis further establishes that IPF possesses moderate predictive ability for platelet recovery with acceptable sensitivity and specificity, while reticulocyte count has poor predictive value and no significant clinical utility in assessing platelet recovery. Therefore, IPF

emerges as a useful hematological marker for predicting platelet recovery in dengue patients with thrombocytopenia and may aid clinicians in patient monitoring and management.

Routine monitoring of Immature Platelet Fraction should be considered in dengue patients with thrombocytopenia for early prediction of platelet recovery. Larger multicentric studies with longer follow-up are recommended to further validate IPF as a reliable prognostic hematological marker in dengue infection.

### REFERENCES

1. World Health Organization. Dengue and severe dengue. World Health Organization. 2017. p. 1–7.
2. Tahlan A, Bhattacharya A. Haematological profile of dengue fever. *Int J Res Med Sci.* 2017;5:5367.
3. Chao CH, Wu WC, Lai YC, Dengue virus nonstructural protein 1 activates platelets via Toll like receptor 4, leading to thrombocytopenia and hemorrhage. *PLoS Pathog.* 2019;15:e1007625.
4. Azeredo EL de, Monteiro RQ, de-Oliveira Pinto LM. Thrombocytopenia in dengue: interrelationship between virus and the imbalance between coagulation and fibrinolysis and inflammatory mediators. *Mediators Inflamm.* 2015;2015.
5. Rajapakse S, de Silva NL, Weeratunga P, Rodrigo C, Fernando SD. Prophylactic and therapeutic interventions for bleeding in dengue: a systematic review. *Trans R Soc Trop Med Hyg.* 2017;111:433–9.
6. Kracalik I, Mowla S, Basavaraju S V, Sapiano MRP. Transfusion-related adverse reactions: Data from the National Healthcare Safety Network Hemovigilance Module—United States, 2013–2018. *Transfusion.* 2021; 61:1424–34.
7. Khan Assir M. Time to stop prophylactic platelet transfusion for adult dengue. *Lancet (London, England).* 2017; 389:1583–4.
8. Looi KW, Matsui Y, Kono M, Evaluation of immature platelet fraction as a marker of dengue fever progression. *Int J Infect Dis.* 2021; 110:187–94.
9. Briggs C, Kunka S, Hart D, Oguni S, Machin SJ. Assessment of an immature platelet fraction (IPF) in peripheral thrombocytopenia. *Br J Haematol.* 2004; 126:93–9.
10. Bat T, Leitman SF, Calvo KR, Chauvet D, Dunbar CE. Measurement of the absolute immature platelet number reflects marrow production and is not impacted by platelet transfusion. *Transfusion.* 2013;53:1201–4.