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Curr. Trends Med. Clin. Res. 2025; 1(1): 1–9

Original Article Open Access

Clinical and Etiological Profile of Fever with Thrombocytopenia in Patients Admitted to Medical Wards of RDT Hospital, Andhra Pradesh – A Cross-Sectional Study

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ARTICLE INFO

Article history:
Received 9 September 2025
Received in revised form
12 October 2025
Accepted 14 October 2025
Available online 20 October 2025

Keywords:
Fever
Thrombocytopenia
Dengue
Malaria
Scrub Typhus

ABSTRACT

Background: Fever accompanied by thrombocytopenia is a common but critical clinical scenario in tropical regions like Andhra Pradesh, often associated with infectious etiologies such as dengue, malaria, and scrub typhus. The combination poses diagnostic and therapeutic challenges due to overlapping symptoms and the potential for rapid clinical deterioration.

Objective: This study aimed to evaluate the clinical manifestations, etiological profile, and the correlation between the severity of thrombocytopenia and bleeding tendencies among febrile patients admitted to a rural tertiary care centre.

Methods: A cross-sectional study was conducted at RDT Hospital, Bathalapalli, involving 115 adult patients admitted with fever (>98.9°F) and platelet count <150,000/μL over 12 months. Patients were evaluated through clinical examination, laboratory investigations, and serological testing. Data were statistically analysed using SPSS version 21.0, with a significance level set at $p<0.05$.

Results: The majority of patients were male (67%) and under 30 years of age. Common symptoms included chills (86.1%),body pain (52.2%),and cough (48.7%).Dengue NS1 antigen was positive in 32.2% of cases,followed by scrub typhus (20.9%)and malaria (14.8%).Bleeding manifestations were observed in 6.1% of patients, significantly associated with platelet counts
<50,000/μL ($p<0.0001$). Liver enzyme elevations (SGOT and SGPT) were noted in over 75% of patients, Hepatomegaly 7% and splenomegaly in 51% indicating systemic involvement.

Conclusion: Dengue fever remains the most prevalent cause of febrile thrombocytopenia in this setting, followed by scrub typhus and malaria. Early identification and targeted management based on local epidemiology can significantly improve patient outcomes.

INTRODUCTION

Fever with thrombocytopenia presents a significant diagnostic and therapeutic challenge in clinical practice, especially in tropical and subtropical regions where infectious diseases are endemic. Thrombocytopenia, defined as a platelet count below 150,000/μL, coupled with febrile illness, is a common clinical scenario requiring urgent attention due to its potential for life-threatening complications if not promptly diagnosed and managed [1,2]. The normal platelet count in healthy individuals ranges between 150,000 and 450,000/μL of blood. A drop below this threshold can lead to clinical manifestations such as petechiae, purpura, gum bleeding, and, in severe cases (platelet count <5,000/mm^3), life-threatening haemorrhages involving the gastrointestinal tract or central nervous system [3,4]. Various etiological factors contribute to thrombocytopenia, including viral, bacterial, and protozoal infections, occasionally accompanied by Disseminated Intravascular Coagulation (DIC) [5,6].

Infections such as dengue, malaria, leptospirosis, scrub typhus, rickettsial infections, meningococcal sepsis, urinary tract infections, and enteric fever are prominent causes of febrile thrombocytopenia in India [7,8]. The clinical presentation is often nonspecific and overlapping, necessitating a comprehensive diagnostic evaluation and timely intervention [9].

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Seasonal patterns play a critical role in the incidence of febrile thrombocytopenia. The condition typically surges during the monsoon and post-monsoon periods, when vector-borne and waterborne infections are prevalent [10]. Many patients present with multi-organ dysfunction and require hospitalisation, and multi-organ counts require close monitoring. The severity of thrombocytopenia often correlates with the presence and extent of bleeding manifestations [11].

While some individuals recover spontaneously, others may experience rapid clinical deterioration, warranting close monitoring, especially when platelet counts fall sharply [12,13]. The interplay between the infectious agent and host immune response often dictates the clinical course and outcome, adding complexity to management [14].

Dengue fever, in particular, is known for haematological complications such as thrombocytopenia, hemoconcentration, and elevated liver enzymes. The critical phase of dengue occurs 2–7 days after symptom onset and may involve warning signs like abdominal pain, persistent vomiting, mucosal bleeding, hepatomegaly, and fluid accumulation [15,16].

Malaria, particularly from Plasmodium falciparum, can result in cerebral involvement, metabolic derangements, and thrombocytopenia with or without haemorrhage [17,18].

Leptospirosis may present in anicteric or icteric forms (Weil's disease), frequently associated with renal and hepatic dysfunction [19]. Scrub typhus, caused by Orientia tsutsugamushi, may lead to vasculitis, multiorgan failure, and thrombocytopenia, often with a characteristic eschar [20,21]. Septicemia induces thrombocytopenia through platelet activation, destruction, and bone marrow suppression [22]. Enteric fever and urinary tract infections also contribute significantly to the spectrum of febrile thrombocytopenia, particularly in endemic settings [23,24].

Given the diagnostic ambiguity and regional variability in causes, understanding the local epidemiological and clinical profile is vital. In rural healthcare setups like RDT Hospital in Bathalapalli, Andhra Pradesh,where advanced diagnostics may be limited,profiling the clinical manifestations, etiological patterns, and severitygrading of thrombocytopenia can support more effective triage and management [25,26,27,28].

METHODS

Study Setting

The study was conducted in the Department of Family Medicine at Rural Development Trust (RDT) Hospital, Bathalapalli, Sri Sathya Sai District, Andhra Pradesh, India.

Study Population

All patients admitted to the medical wards of RDT Hospital who fulfilled the inclusion criteria were enrolled in the study.

Study Criteria

Inclusion Criteria

- Patients aged above 18 years
- Documented fever (temperature >98.9°F in the morning or >99.9°F in the evening)
- Platelet count <150,000/μL

Exclusion Criteria

- Patients aged below 18 years
- Patients presenting with thrombocytopenia without fever
- Cases of congenital thrombocytopenia
- Diagnosed cases of primary immune thrombocytopenic purpura (ITP)
- Known platelet function disorders or gestational thrombocytopenia
- Patients with drug-induced thrombocytopenia, malignancy, or other haematological disorders were excluded after a detailed medical history review, previous investigation assessment, and relevant laboratory or diagnostic confirmation

Study Design

A hospital-based cross-sectional study.

Sample Size

A total of 115 patients were included. The sample size was calculated based on the prevalence of fever with thrombocytopenia reported in previous studies, considering a 95% confidence level and a 10% allowable error. All eligible patients admitted during the study period were enrolled in the study.

Study Duration

12 months

Study Procedure

All eligible patients admitted to the medical wards of RDT Hospital during the study period were recruited. After stabilization, the study purpose and procedure were explained in the patient's native language, and written informed consent was obtained either from the patient or a legally authorized representative.

A detailed medical history was recorded, followed by a comprehensive general and systemic examination. Necessary laboratory and diagnostic investigations were performed as indicated. Platelet counts were monitored serially, and bleeding manifestations were observed until recovery. All data were documented using a pre-structured questionnaire.

Ethical Approval

The study titled "Clinical and Etiological Profile of Fever with Thrombocytopenia in Patients Admitted to Medical Wards of RDT Hospital, Andhra Pradesh — A Cross-Sectional Study" received approval from the Institutional Ethics Committee (IEC) of RDT Hospital (Approval No: RDTH/BTP/ETHICS/2022/12).

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Statistical Analysis

Data were expressed as mean ± standard deviation (SD), frequency, and percentage. Continuous variables were analyzed using one-way analysis of variance (ANOVA), while categorical variables were compared using Pearson's chi-square test. A p-value <0.05 was considered statistically significant (two-tailed). Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp., Armonk, NY, USA).

Diagnostic Criteria

- **Dengue**: Positive NS1 antigen or IgM antibody by rapid diagnostic test.
- **Malaria**: Detection of Plasmodium species on peripheral blood smear.
- **Leptospirosis**: Positive IgM ELISA test.
- **Rickettsial fever**: Weil–Felix test with a titer ≥1:320.
- **Scrub typhus**: Positive IgM rapid diagnostic test for Orientia tsutsugamushi.
- **Typhoid fever**: Positive Salmonella Typhi IgM or positive blood culture.
- **Brucellosis**: Positive standard agglutination test for Brucella spp.
- **HIV infection**: Initially screened by a rapid test, followed by confirmation with ELISA and Western blot.
- **Sepsis**: Confirmed by positive blood culture.
- **Urinary tract infection (UTI)**: Confirmed by positive urine culture.

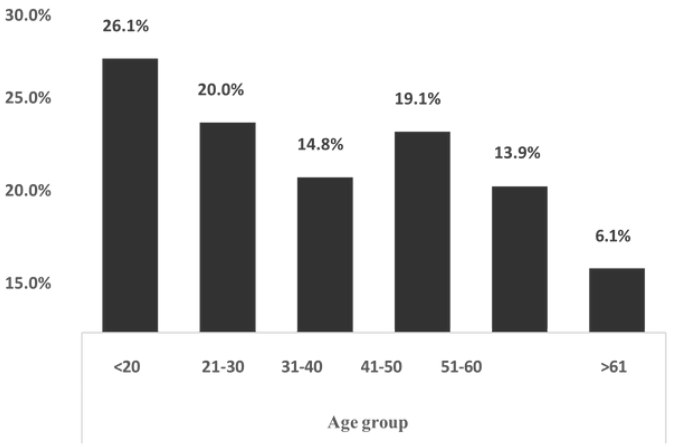
RESULT

As per Table 1 and Fig 1 the age distribution of patients with fever and thrombocytopenia admitted to the medical wards showed a higher prevalence in younger age groups. Most patients (26.1%) were below 20 years of age, followed by those in the 21-30 age group (20.0%). Patients aged 41-50 years comprised 19.1% of the total, whereas those aged 31-40 and 51-60 years constituted 14.8% and 13.9%, respectively. The lowest percentage (6.1%) was observed in the patients aged > 61 years. This distribution indicates that a significant proportion of younger individuals were affected by fever and thrombocytopenia in this rural hospital setting.

Table 1: Age Distribution of Patients with Fever and Thrombocytopenia

Age Group (Years)	Number of Patients	Percentage (%)
< 20	30	26.10%
21 – 30	23	20.00%
31 – 40	17	14.80%
41 – 50	22	19.10%
51 – 60	16	13.90%
> 61	7	6.10%

Figure 1 Age Distribution of Patients with Fever and Thrombocytopenia



Note. N = 115. Percentages represent the proportion of total patients

Table 2 Indicates among patients with fever and thrombocytopenia, 67.0% were male and 33.0% were female, indicating a male predominance

Table 2. Gender distribution of patients with fever and thrombocytopenia

Gender	Number of Patients	Percentage (%)
Female	38	33.00%
Male	77	67.00%

Table 3 and Figure 2 Showed that Chills were the most common symptom (86.1%), followed by body pain (52.2%), cough (48.7%), and headache (42.6%). Burning micturition (30.4%), abdominal pain (27.0%), and vomiting (23.5%) were also reported. Less frequent symptoms included joint pain (13.0%), breathlessness (9.6%), diarrhoea (8.7%), rashes (4.3%), sore throat (0.9%), and others (0.9%), with no cases of seizures.

Figure 2. Clinical manifestations and frequencies in patients

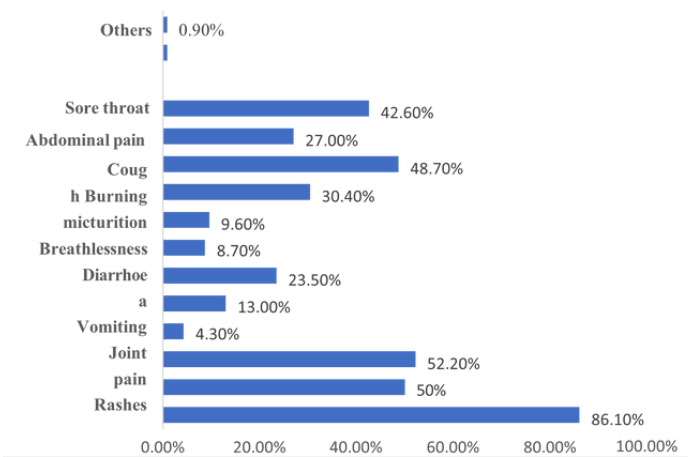


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Table 3. Clinical manifestations and frequencies in patients

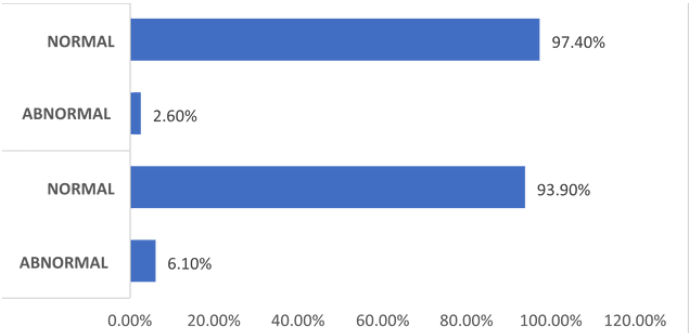
Symptom	Number of Patients	Percentage (%)
Chills	99	86.10%
Rigor	58	50.00%
Body pain	60	52.20%
Rashes	5	4.30%
Joint pain	15	13.00%
Vomiting	27	23.50%
Diarrhoea	10	8.70%
Breathlessness	11	9.60%
Burning micturition	35	30.40%
Cough	56	48.70%
Abdominal pain	31	27.00%
Headache	49	42.60%
Seizures	0	0.00%
Sore throat	1	0.90%
Others	1	0.90%
Hepatomegaly	8	7%
Splenomegaly	59	51%

As per Table 4 and Figure 3 Routine urine analysis showed that 93.9% (n=108) of patients had normal results, whereas 6.1% (n=7) had abnormal findings. Serum lactate levels were abnormal in 2.6% (n=3) of the cases, with 97.4% (n=112) showing normal levels.

Table 4. Laboratory test results in patients

Test	Result	Number of Patients	Percentage (%)
Urine Routine	Abnormal	7	6.10%
	Normal	108	93.90%
Serum lactate	Abnormal	3	2.60%
	Normal	112	97.40%

Figure 3. Laboratory test results in patients



As shown in Table 5, Dengue NS1 antigen was positive in 32.2% of patients, with IgM and IgG antibodies detected in 17.4% and 8.7%, respectively. Mp smear confirmed malaria in 14.8% of cases. Scrub typhus IgM was found in 20.9%, Weil-Felix in 9.6%, Leptospira IgM in 3.5%, and Salmonella IgM in 7.0%.

Brucella antibodies were seen in 2.6%. Blood cultures were abnormal in 3.5%, and urine cultures showed growth in 2.6% of patients, indicating varied infectious causes of fever with thrombocytopenia

Figure 4 Serological and microbiological test results in patients

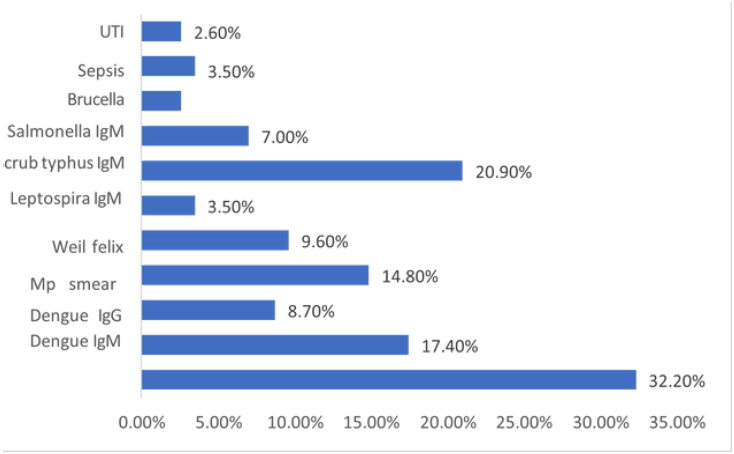


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Table 5 serological and microbiological test results in patients

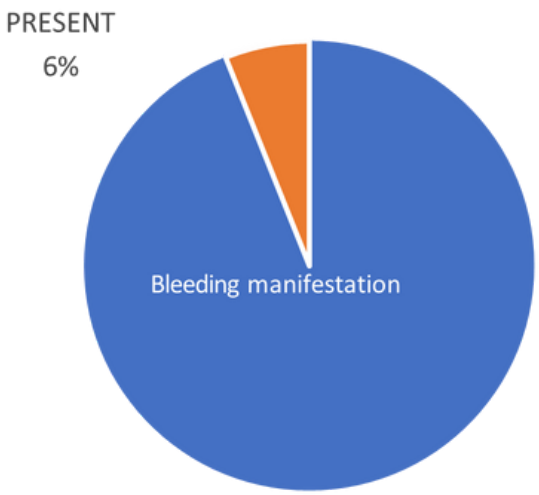
Test	Number of Patients	Percentage (%)
Dengue NS1 Ag	37	32.20%
Dengue IgM	20	17.40%
Dengue IgG	10	8.70%
Mp Smear	17	14.80%
Weil Felix	11	9.60%
Leptospira IgM	4	3.50%
Scrub Typhus IgM	24	20.90%
Salmonella IgM	8	7.00%
Brucella	3	2.60%
Sepsis (Blood Culture)	4	3.50%
UTI (Urine Culture)	3	2.60%

Most patients (93.9%, n=108) did not exhibit any bleeding manifestations during their hospital stay. However, 6.1% (n=7) of patients presented with bleeding manifestations. This finding suggests that although bleeding is not common in this patient population, it is still observed in a notable minority of cases as mentioned in Table 6 and Figure 5.

Table 6. Presence of bleeding manifestations in patients

Bleeding Manifestation	Number of Patients	Percentage (%)
Absent	108	93.90%
Present	7	6.10%

Figure 5. Presence of bleeding manifestations in patients



Hemoglobin (Hb) levels averaged 12.65 g/dL with a standard deviation of 2.37 g/dL, indicating moderate variability in Hb values among the patients. Total leukocyte count (Tc) averaged 7.16 x 10^3 cells/mm^3 with a standard deviation of 5.14 x 10^3 cells/mm^3, reflecting a wider range in leukocyte counts. The packed cell volume (PCV) averaged 39.15% with a standard deviation of 14.77%, indicating notable variability in the haematocrit levels. Total bilirubin (T. bilirubin) levels averaged 1.11 mg/dL with a standard deviation of 1.16 mg/dL, suggesting a relatively consistent measurement of bilirubin among the patients. Serum glutamic-oxaloacetic transaminase (SGOT) levels averaged 91.17 U/L with a standard deviation of 63.33 U/L, indicating significant variability in SGOT values. Similarly, serum glutamic-pyruvic transaminase (SGPT) levels averaged 91.82 U/L with a standard deviation of 63.75 U/L, reflecting variability in SGPT measurements as per Table 7.

Hematological and Biochemical Findings

Nearly half of the patients (49.1%) had low haemoglobin levels, indicating a high prevalence of anemia, while 45.6% had normal and 5.3% had elevated Hb. Leukopenia was noted in 17.0% of patients, whereas 71.4% had normal and 11.6% had elevated total leukocyte counts. Packed cell volume (PCV) was decreased in 59.6%, normal in 36.0%, and elevated in 4.4% of cases. Elevated total bilirubin was observed in 25.9% of patients, suggesting possible liver dysfunction. Notably, SGOT and SGPT levels were elevated in 76.1% and 77.9% of patients respectively, indicating widespread hepatic involvement. These findings reflect significant hematological and biochemical disturbances among patients presenting with fever and thrombocytopenia as cited in Table 8 and Figure 7.

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Table 8. Distribution of laboratory parameters in patients

Parameter	Category	Number of Patients	Percentage (%)
Hemoglobin (Hb)	Low	56	49.10%
	Normal	52	45.60%
		6	5.30%
Total Leukocyte Count (Tc)	Low	19	17.00%
	Normal	80	71.40%
	High	13	11.60%
Packed Cell Volume (PCV)	Low	68	59.60%
	Normal	41	36.00%
	High	5	4.40%
Total Bilirubin	Normal	83	74.10%
	High	29	25.90%
SGOT	Normal	27	23.90%
	High	86	76.10%
SGPT	Normal	25	22.10%
	High	88	77.90%

Figure 7. Distribution of laboratory parameters in patients

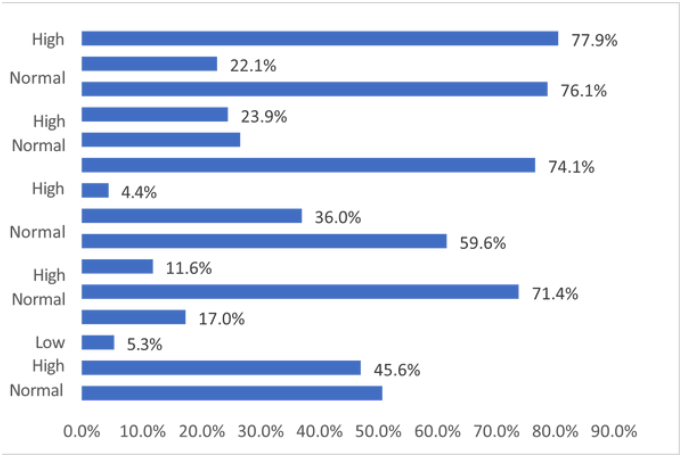

Table 9 Platelet count distribution in patients

Platelet Count (×103/µL)	Number of Patients	Percentage (%)
1.0 – 1.5	56	48.70%
0.75 – 1.0	27	23.50%
0.75 – 0.5	9	7.80%
0.5 – 0.25	12	10.40%
0.25 – 0.1	9	7.80%
< 0.1	2	1.70%

Table 10 relationship between platelet count and bleeding manifestation in patients

Platelet Count (×103/µL)	Bleeding Absent (n)	%	Bleeding Present (n)		p-value
1.0 – 1.5	56	100.00%	0	0.00%	
0.75 – 1.0	26	96.30%	1	3.70%	
0.75 –0.5	8	88.90%	1	11.10%	
0.5 –0.25	11	91.70%	1	8.30%	
0.25 – 0.1	6	66.70%	3	33.30%	
< 0.1	1	50.00%	1	50.00%	
					< 0.0001

Table 11 Association between platelet count and serological test results in patients

		Platelet												P value
		1-1.5		0.75-1		0.75-0.5		0.5-0.25		0.25-0.1		<0.1		
		Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	
Dengue Ns1Ag	NON-REACTIVE	44	56.40%	16	20.50%	6	7.70%	8	10.30%	3	3.80%	1	1.30%	0.106
	REACTIVE	12	32.40%	11	29.70%	3	8.10%	4	10.80%	6	16.20%	1	2.70%	
Dengue IgM	NON-REACTIVE	50	52.60%	21	22.10%	7	7.40%	10	10.50%	6	6.30%	1	1.10%	0.369
	REACTIVE	6	30.00%	6	30.00%	2	10.00%	2	10.00%	3	15.00%	1	5.00%	
Dengue IgG	NON-REACTIVE	52	49.50%	26	24.80%	9	8.60%	10	9.50%	6	5.70%	2	1.90%	0.078
	REACTIVE	4	40.00%	1	10.00%	0	0.00%	2	20.00%	3	30.00%	0	0.00%	
Mp smear	NEGATIVE	50	51.00%	21	21.40%	7	7.10%	10	10.20%	8	8.20%	2	2.00%	0.732
	POSITIVE	6	35.30%	6	35.30%	2	11.80%	2	11.80%	1	5.90%	0	0.00%	
Weil felix	NON-REACTIVE	48	46.20%	26	25.00%	8	7.70%	12	11.50%	9	8.70%	1	1.00%	0.129
	REACTIVE	8	72.70%	1	9.10%	1	9.10%	0	0.00%	0	0.00%	1	9.10%	
Leptospira Ig M	NON-REACTIVE	54	48.60%	26	23.40%	8	7.20%	12	10.80%	9	8.10%	2	1.80%	0.792
	REACTIVE	2	50.00%	1	25.00%	1	25.00%	0	0.00%	0	0.00%	0	0.00%	
Scrub	NON-REACTIVE	39	42.90%	24	26.4	7	7.70%	11	12.1	8	8.80%	2	2.20%	

Serological Findings Based on Platelet Count Groups

As per Table 11, among patients with platelet counts between 1.0–1.5 × 103/μL, the majority were non-reactive for Dengue NS1 (56.4%), IgM (52.6%), and IgG (49.5%). Notably, 32.4% were Dengue NS1 reactive and 70.8% showed Scrub Typhus IgM reactivity.

In the 0.75–1.0 × 10^5/μL group, Dengue NS1 and IgM reactivity were 29.7% and 30.0%, respectively. Malaria smear positivity was 35.3%, while Scrub Typhus IgM positivity dropped to 12.5%. Patients with platelet counts between 0.5–0.75 × 10^5/μL had lower reactivity rates: Dengue NS1 (8.1%), IgM (10.0%), and Scrub Typhus IgM (8.3%). Dengue IgG and Brucella were fully non-reactive.

In the 0.25–0.5 × 10^5/μL group, Dengue NS1 reactivity was 10.8%, and Dengue IgG rose to 20.0%. Most other tests showed minimal reactivity. Among those with platelet counts of 0.1–0.25 × 103/μL, Dengue NS1 and IgM reactivity increased to 16.2% and 15.0%, respectively, while Dengue IgG reached 30.0%. In patients with platelet counts <0.1 × 103/μL, only isolated cases showed positivity: Dengue NS1 (2.7%) and Weil Felix (9.1%).

DISCUSSION

This cross-sectional study offers crucial insights into the clinical and etiological spectrum of febrile thrombocytopenia in a rural tertiary care hospital in Andhra Pradesh [30]. A majority of patients belonged to younger age groups, particularly below 30 years [29], consistent with reports by Choudhary et al. and Martha et al. who found similar age-related susceptibility in Rajasthan and Telangana, respectively [31,32].

Dengue fever emerged as the leading cause, followed by malaria and scrub typhus. These findings align with similar regional studies from Karnataka, Kerala, and Tamil Nadu [33,34]. Notably, 32.2% of patients tested positive for Dengue NS1 antigen, consistent with findings from Radhika et al., who observed dengue in over half of their study cohort [35].

Malaria was diagnosed in 14.8% of patients, echoing the conclusions of Naikwadi et al., who emphasized the need for routine malarial screening in patients with febrile illness [36]. Scrub typhus, leptospirosis, and brucellosis cases further reflect the diverse infectious etiologies in endemic regions, requiring broad-spectrum serological testing [37].

Clinically, hepatomegaly and splenomegaly were frequently noted, suggesting systemic involvement, which was also reported in studies by Martha et al. Bleeding manifestations were most common when platelet counts dropped below 50,000/μL, consistent with findings by Saini et al., who identified petechiae, purpura, and mucosal bleeding as warning signs in such patients [34]. Importantly, no bleeding was observed in patients with platelet counts >100,000/μL, underscoring the multifactorial nature of bleeding risk [38].

Elevated liver enzymes (SGOT and SGPT) were present in over 75% of patients, Hepatomegaly present over 7% reflecting hepatic involvement typical of viral infections such as dengue and leptospirosis [19].

These findings highlight the importance of a structured diagnostic approach, particularly during monsoon seasons when infectious etiologies are prevalent. Establishing diagnostic panels covering common tropical infections is critical in rural hospitals. Geographic and seasonal variation in causative agents necessitates continuous epidemiological surveillance to tailor public health interventions.

Improving awareness, enhancing early detection protocols, and strengthening vector control strategies will help reduce the incidence and severity of febrile thrombocytopenia in resource- limited settings like RDT Hospital. Thus, clinical vigilance and regional data integration are vital to optimize outcomes in affected populations [39].

CONCLUSION

In conclusion, our findings on the clinical and etiological profile of fever with thrombocytopenia align with numerous other studies highlighting infectious diseases, particularly dengue and malaria, as the primary causes. The similarities and differences observed across various studies emphasise the geographic and seasonal variations in the etiology of thrombocytopenia, importance of tailored diagnostic approaches, and need for region-specific clinical guidelines. Comprehensive diagnostic evaluation, early diagnosis, and prompt management are crucial for improving patient outcomes. Future research should focus on addressing diagnostic challenges, developing advanced diagnostic tools, and exploring effective treatment modalities to optimize patient care. Public health interventions aimed at controlling vector populations and promoting preventive measures are essential for reducing the incidence of febrile thrombocytopenia and improving public health outcomes.

CLINICAL OUTCOMES AND RECOVERY

In this study of 115 patients with febrile thrombocytopenia, most patients demonstrated favourable recovery with appropriate supportive care and targeted management of the underlying infection. Bleeding manifestations were observed in only 6.1% of cases, primarily among those with platelet counts <50,000/μL. Elevated liver enzymes (SGOT, SGPT) were present in over 75% of patients, suggesting systemic involvement; Hepatomegaly was present in 7 % and splenomegaly present in 52%.However, these abnormalities resolved with treatment. While specific mortality data were not explicitly recorded in this study, no major life-threatening hemorrhages or fatal complications were reported, indicating a generally positive clinical outcome.

LIMITATIONS

The absence of precise recovery timelines, follow-up data, and mortality rates limits the ability to assess the full clinical impact of febrile thrombocytopenia in this population. Future studies with longitudinal follow-up are needed to quantify outcomes more accurately and guide risk stratification.

Acknowledgment
The authors would like to express sincere gratitude to the management and medical staff of RDT Hospital, Bathalapalli, Andhra Pradesh, for their support and cooperation throughout the study. We are especially thankful to the Department of General Medicine for granting access to patient records and facilitating sample collection and laboratory investigations. Special thanks to the data collection and technical team for their assistance in compiling and analyzing the clinical data.

Conflicts of Interest
The authors declare that there are no conflicts of interest related to this study. The research was conducted independently, and the findings represent the unbiased results and interpretations of the authors.

Financial Support
This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. It was conducted as part of academic research under institutional support from RDT Hospital, Andhra Pradesh.

Data Availability
The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data will be made available to qualified researchers for non-commercial purposes only, subject to ethical and privacy considerations. Due to privacy restrictions, participant data cannot be publicly shared, but can be accessed by contacting the corresponding author.

Ethical Consideration
The study titled "Clinical and Etiological Profile of Fever with Thrombocytopenia in Patients Admitted to Medical Wards of RDT Hospital, Andhra Pradesh – A Cross-Sectional Study" received approval from the Institutional Ethics Committee (IEC) of RDT Hospital (Approval No: RDTH/BTP/ETHICS/2022/12).

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