

**Early Warning Score in Febrile Thrombocytopenia: A Prospective Study in a Tertiary Care Center, Erode, Tamilnadu****C. Vignesh<sup>1</sup>, S. Rajesh Kumar<sup>2</sup>, J. Saravana Priya<sup>3</sup>, R. Shanmugasundaram<sup>4</sup>**<sup>1,2</sup>Senior Resident, Department of General Medicine, Government Erode Medical College Hospital, Perundurai, Affiliated under the Tamilnadu Dr MGR Medical University, Chennai<sup>3</sup>Assistant Professor, Department of General Medicine, Government Erode Medical College Hospital, Perundurai, Affiliated under the Tamilnadu Dr MGR Medical University, Chennai<sup>4</sup>Professor & Head, Department of General Medicine, Government Erode Medical College Hospital, Perundurai, Affiliated under the Tamilnadu Dr MGR Medical University, Chennai

Received: 25-08-2024 / Revised: 23-09-2024 / Accepted: 26-10-2024

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Conflict of interest: Nil

**Abstract:****Background:** Fever with thrombocytopenia is a significant clinical presentation, often associated with infectious diseases, hematological disorders, and systemic illnesses. Despite its prevalence, there is a paucity of standardized tools for assessing disease severity and guiding treatment.**Objective:** This study aimed to evaluate patients presenting with fever and thrombocytopenia, identify predictors of mortality, and develop an early warning scoring system to aid clinical decision-making and improve patient outcomes.**Methods:** A prospective study was conducted on 100 adult patients admitted with fever and thrombocytopenia at Government Erode Medical College Hospital, Perundurai, over one year. Clinical and laboratory parameters, systemic involvement, and outcomes were assessed. A scoring system was derived based on clinical findings, laboratory results, and systemic involvement.**Results:** The cohort comprised 55 males and 45 females, with a mean age of 30 years. Key findings included a significant correlation between lower oxygen saturation, elevated respiratory rate, abnormal hematocrit, and worse outcomes. Bleeding manifestations were present in 31% of patients, and 40% required platelet transfusion. Mortality was 13%, predominantly due to multisystem dysfunction. The developed scoring system identified patients at higher risk for adverse outcomes and guided early interventions.**Conclusion:** This study highlights the clinical importance of assessing febrile thrombocytopenia with a focus on systemic involvement and vital signs. The derived scoring system is an inexpensive, reproducible bedside tool that aids in early prognosis, guiding treatment strategies, and improving patient survival. Further multicenter studies with larger cohorts and extended follow-ups are recommended to validate and refine the scoring system.**Keywords:** Fever, Thrombocytopenia, Scoring System, Prognosis, Systemic Involvement, Patient Outcomes.

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**Introduction**

Fever is a significant and prevalent symptom of several illnesses and an indication of systemic illness. Fever, referred to as "Pyrexia," derives from the Greek term "pyretus," signifying fire. The term "Febrile" originates from the Latin word "Febris," signifying fever.

Research on healthy persons aged 18-40 indicates that the average oral temperature is  $36.8 \pm 0.4$  °C, with lower readings at 6 a.m. and elevated readings between 4-6 p.m. Rectal temperatures are approximately 0.4 deg c (0.7deg F) higher than oral values. Fever is a rise in body temperature that surpasses the typical daily range and occurs in association with an increase in the hypothalamic set point. [1] According to many studies, a morning

temperature of 37.2°C (98.9°F) or an evening temperature of 37.7°C (99.9°F) constitutes a fever. A temperature above 41.5 degrees Celsius (106.7 degrees Fahrenheit) is termed hyperpyrexia. This very high fever may arise in individuals with severe illnesses, although it most often occurs in cases with CNS haemorrhages.[2]

Fever often manifests with other signs and symptoms, seldom presenting as an alone illness. It is often accompanied with thrombocytopenia. The standard platelet count ranges from 150,000 to 450,000 cells per cubic millimetre. It arises from either heightened sequestration or destruction of platelets, or diminished creation. The causes of thrombocytopenia range from idiopathic and

autoimmune conditions to infections and malignancies. The predominant cause of individuals presenting with acute febrile sickness with thrombocytopenia is often of infectious origin, such as malaria, dengue, typhoid, and leptospirosis. These infectious illnesses are prevalent in tropical nations such as India.[3]

In recent years, fever accompanied with thrombocytopenia has become a prevalent clinical manifestation. It results in considerable morbidity characterised by bleeding manifestations, haemodynamic instability, and sometimes culminates in fatality. This induces heightened anxiety in patients and their families. Literature presents several research about fever with thrombocytopenia symptoms and their clinicopathological characteristics. However, there is a scarcity of research concerning the early predictors of its morbidity and death.[4]

This research focuses on evaluating individuals with fever and thrombocytopenia, identifying mortality markers, and developing an early warning score to facilitate effective treatment. The goal is to reduce morbidity and death among these patients, aiding basic and secondary care facilities in anticipating severe illnesses and referring them to advanced and intensive care centers. The study also aims to design a score system for managing medication and additional treatments in patients with fever and thrombocytopenia, thereby improving outcomes. The research aims to improve patient outcomes by reducing morbidity and death rates.

### Materials and Methods

The research was conducted on patients admitted to the medical ward and IMCU Intermediate Medical Care Unit of Government Erode Medical College Hospital, Perundurai, over the course of one year. All tests were conducted with the requisite approval from the Institutional Ethical Committee and informed consent from the participants.

The study included patients over 18 years old, with fever and thrombocytopenia in complete hemograms, and a platelet count below 150000/cu.mm. Exclusions included those taking thrombocytopenia-causing drugs, pregnant patients, those with chronic thrombocytopenic conditions, and those without consent.

### Period of study:

All the patients in the study group were age more than 18 years admitted as in patients between December 2023 to November 2024 in Medicine department in Government Erode medical college Medical college Hospital for fever were evaluated.

**Study design:** prospective study

### Methods

All patients admitted to Government Erode Medical College Hospital with fever and thrombocytopenia were assessed. A comprehensive history was obtained from all patients hospitalised throughout the research period, including the length of fever, occupational background, and travel history. Documented history of bleeding manifestations and other symptoms was recorded. Vital indicators such as pulse rate, respiration rate, blood pressure, temperature, and oxygen saturation were recorded. Indicators of central nervous system, respiratory system, renal, haematological, and hepatic involvement were seen. Upon admission, investigations included a full hemogram, standard urinalysis, renal function tests, liver function tests, prothrombin time (PT), activated partial thromboplastin time (APTT), international normalised ratio (INR), chest X-ray, and abdominal ultrasound were conducted. Upon admission, a grading system was developed based on clinical examination, laboratory investigation results, systemic involvement, and patient outcomes.

### Evaluation

The research involved hospitalized patients with fever and thrombocytopenia, who were monitored and clinically assessed. Patients' vital signs were recorded, and a comprehensive clinical assessment was conducted. Symptoms of systemic involvement were examined using various methods. The central nervous system involved altered sensorium, seizures, and reduced awareness, while the respiratory system involved breathing trouble, cough, sputum production, tachypnea, decline in oxygen saturation, and infiltrates in chest x-rays. Haematological manifestations were observed, including bleeding tendencies, reduced urine production, haematuria, and elevated levels of urea and creatinine. The renal system involved reduced urine production, haematuria, and elevated levels of urea and creatinine. Hepatic involvement was assessed by jaundice, fluid overload, elevated liver enzymes, and abnormal coagulation profiles. Patients receiving platelet transfusions were observed. The study also recorded the causes of the deceased patients and their deaths.

### Results

A study involving 100 patients with fever and thrombocytopenia at Government Erode Medical College and Hospital was conducted. After analyzing their clinical conditions, vitals, systemic involvement, and mortality outcomes, a scoring system was derived. Most patients were below 30 years old, with 55 males and 45 females, with age and sex factors being statistically insignificant for the cause of mortality.

The study recorded pulse rate and systolic blood pressure in 100 cases of febrile thrombocytopenia. Patients with increased pulse rate had a higher mortality rate. Pulse rate was significantly higher in patients over 100 (37.3%) and less than 100 (63.6%). Systolic blood pressure did not have a statistically significant value for mortality. Patients with a pulse rate below 100mmHg (25%) had a higher mortality rate (75%). Systolic blood pressure was not significantly related to mortality. The study suggests that monitoring pulse rate and systolic blood pressure is crucial for patient care.

Most patients have a higher temperature than 100 degrees Fahrenheit, which is statistically insignificant in terms of mortality. The mean temperature versus outcome showed that 93% of patients had a high temperature, while only 7% had a normal temperature. Lower oxygen saturation at admission leads to worse prognosis in patients. The percentage of patients with oxygen saturation varies from 3% to 96%. The outcome of patients with lower oxygen saturation is significantly lower, with a mean of 96.38 and an average of 97.96.

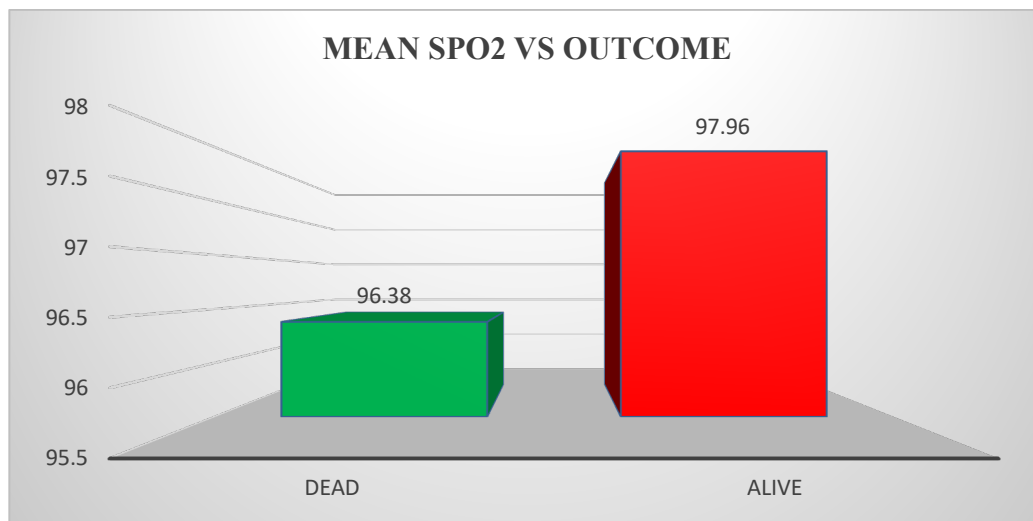


Figure 1: Oxygen Saturation Vs Outcome

Figure 1 shows Lower oxygen saturation at admission leads to worse prognosis in patients. The percentage of patients with oxygen saturation varies from 3% to 96%. The outcome of patients with lower oxygen saturation is significantly lower, with a mean of 96.38 and an average of 97.96.

The study found that among 100 cases, 63 patients had an increased respiratory rate, but it did not significantly affect mortality. The response rate was 63% for patients over 16 and 37% for those under

16. The outcome showed a mean of 19.63 deaths and 17.75 lives, with an unpredicted T-Test value of 0.153.

The study found that out of 100 cases, 58 patients had normal haematocrit values, while 39 had increased or decreased values. Patients with increased haematocrit had a worse prognosis. The mean haematocrit was 4.81, with 45 patients dying and 41.96 alive. The unavoidable T-Test result was significant at 0.013(Figure 2).

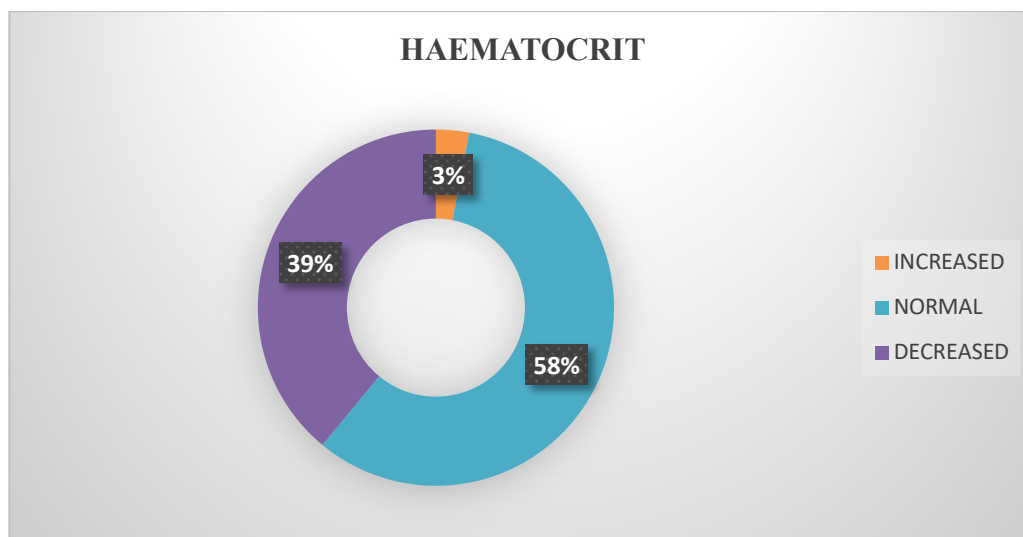


Figure 2: Haematocrit

The table 1 reveals that out of 100 cases, 44 have a platelet count below 40000 cells/cu.mm, 41 have a platelet count between 40001-80000 cells/cu.mm, and 15 have a platelet count over 80000

cells/cu.mm. The mean platelet count is compared to the outcome, with the mean being the number of dead patients and the average being the number of alive patients.

Table 1: Platelet Count Vs Outcome

Outcome	Platelet Count	
	Mean	SD
Dead	22769	20228
Alive	51919	30314
Unpaired T Test		
P Value - 0.001		
Significant		

The study analyzed the involvement of the central nervous system, respiratory system, hematological system, renal system, and hepatic system in patients with febrile thrombocytopenia. The total number of patients with these conditions was 100, with 6 patients having central nervous system complications, 6 having respiratory involvement, 3 having haematological involvement, 13 having renal involvement, 14 having hepatic involvement, and 2 having a total death.

The results showed that patients with febrile thrombocytopenia with central nervous system involvement had a worse prognosis. The percentage of patients with respiratory involvement was 66%, with 6 patients having respiratory involvement, 9% having respiratory involvement, 3% having hematological involvement, 3% having renal involvement, and 8% having hepatic

involvement. The study also found that patients with hepatic involvement had a worse prognosis. The percentage of patients with hepatic involvement was 14-14%, with 86% having hepatic involvement, and 8% having a total death.

In conclusion, the study found that patients with febrile thrombocytopenia with central nervous system, respiratory, hematological, renal, and hepatic involvement had a worse prognosis. The study highlights the importance of understanding the role of these factors in patient outcomes and treatment strategies. Figure 3 shows that out of 100 cases, 31 patients showed bleeding symptoms, with 8 of them having bleeding at admission. The bleeding manifestations were 31% present, 69% absent, and 69% positive. The outcome was a significant decrease in bleeding, with a Chi Square Test indicating a P value of 0.011.

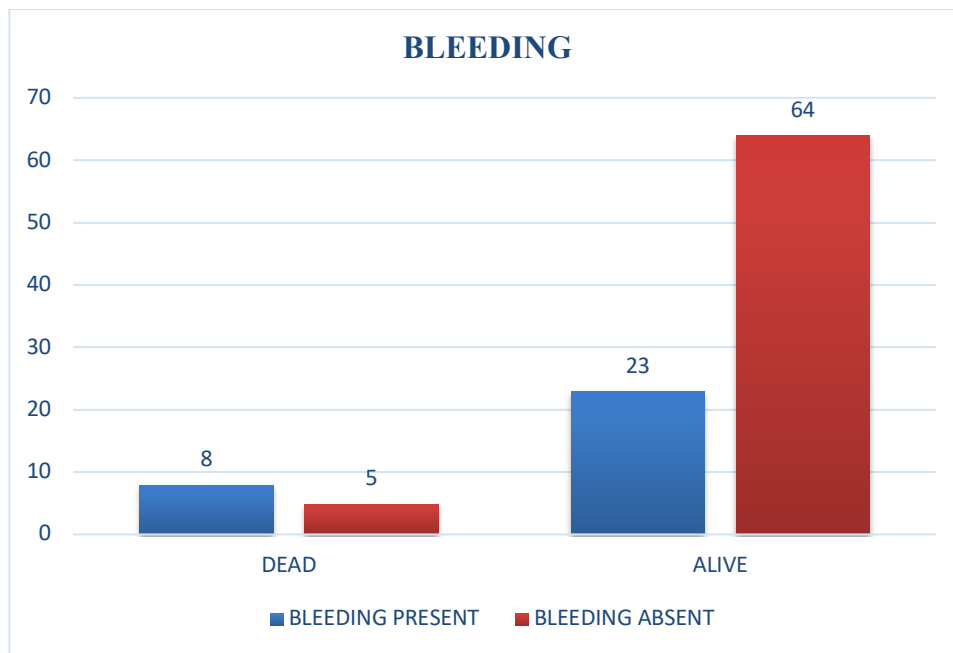


Figure 3: Bleeding Manifestations Vs Outcome

In our study of 100 cases of febrile thrombocytopenia, platelet transfusion was given for 40 patients. Table 2 shows the In a study of 100 febrile thrombocytopenia cases, 40 patients underwent platelet transfusion. The percentage of patients who received platelet transfusion was 40%, while 60% did not. The outcome of platelet transfusion was significant, with a chi-square test indicating a 0.004 P value.

Table 2: Platelet Transfusion Vs Outcome

Outcome	Platelet Transfusion	
	Yes	No
Dead	10	3
Alive	30	57
Chi Square Test		
<b>P Value - 0.004</b>		
Significant		

Out of 100 study cases, 13 died due to multisystem dysfunction and various cases. The percentage of patients who died was 13%, while the percentage of alive patients was 87%.

Table 3 shows The Pearson correlation test showed no significant correlation with age, sex, pulse rate, systolic blood pressure, temperature, spo2%, respiratory rate, haemocytosis, platelet count, CNS, RS,

hAEMOLOGY, renal, hepatic, bleeding, and platelet transfusion.

The results were not significant for any other parameters such as ages, sex, pulse rate, systolic blood pressure, temperature, spo2%, respiratory rate, haemocytosis, platelet count, CNS, RS, hAEMOLOGY, renal, hepatic, bleeding, and platelet transfusion.

Table 3: Correlation of Outcome with All Parameters

Pearson Correlation Test			
Parameters	R Value	P Value	Inference
Age	0.104	0.304	Non-Significant
Sex	-0.009	0.929	Non-Significant
Pulse Rate	-0.277	0.005	Significant
Systolic Bp	0.173	0.086	Non-Significant
Temperature	-0.195	0.052	Non-Significant
Spo2%	0.292	0.003	Significant
Respiratory Rate	-0.144	0.153	Non-Significant
Haematocrit	0.247	0.013	Significant
Platelet Count	0.322	0.001	Significant

Cns Involvement	0.153	0.129	Non-Significant
Rs Involvement	0.153	0.129	Non-Significant
Haematology	0.106	0.292	Non-Significant
Renal Involvement	0.293	0.003	Significant
Hepatic Involvement	0.444	0.001	Significant
Bleeding	0.255	0.001	Significant
Platelet Transfusion	0.291	0.003	Significant

## Discussion

In the context of our study involving 100 patients presenting with fever and thrombocytopenia, we have derived a clinical scoring system that utilizes initial vital signs and systemic involvement at the time of admission to predict the need for intensive management. The significance of this scoring system lies in its ability to identify patients who exhibit unstable vital signs and systemic involvement, as these patients are likely to have a higher risk of mortality and require more aggressive therapeutic interventions. The underlying causes of fever and thrombocytopenia in our cohort were predominantly infectious diseases, including dengue, malaria, and leptospirosis, alongside some hematological disorders. Notably, patients with multisystem involvement were frequently diagnosed with sepsis, which is associated with a markedly worse prognosis in terms of mortality [5,6]. Thrombocytopenia is a common hematological finding in clinical practice, often seen in conjunction with various infectious diseases. For instance, malaria, dengue, and leptospirosis are well-documented causes of fever and thrombocytopenia [7,8].

Furthermore, severe multisystem illnesses such as thrombotic microangiopathies, disseminated intravascular coagulation (DIC), and sepsis can also present with thrombocytopenia, indicating a complex interplay between infectious and hematological factors [6]. Additionally, viral infections, including varicella, parvovirus, hepatitis C, and Epstein-Barr virus, have been implicated in cases of thrombocytopenia, further complicating the clinical picture [9]. In patients with HIV, thrombocytopenia is frequently observed, highlighting the need for careful monitoring and management in this population [10].

The presence of fever and thrombocytopenia can indicate a wide range of underlying conditions, from infectious diseases to hematological disorders and life-threatening illnesses like sepsis (Inada-Kim, 2022). Patients presenting with these symptoms often require urgent evaluation and management, as the severity of their condition can vary significantly [11].

Despite the importance of this clinical presentation, there is a lack of standardized tools to assess dis-

ease severity and guide clinical decision-making. Previous studies have developed scoring systems for specific conditions, such as sepsis and COVID-19, but a comprehensive approach to febrile thrombocytopenia is needed. (Rodriguez-Nava et al., 2020) [12]

## Summary

A study of 100 febrile thrombocytopenia cases in a hospital found that patients aged 18-30 had worse prognosis, with higher temperatures, lower oxygen saturation, and lower platelet counts. Some patients had complications, including central nervous system, respiratory, and bleeding. A scoring system helped assess prognosis early and provide appropriate care.

**Limitations:** It is single centred study with small number of patients. Patients are evaluated with bedside clinics and basic investigations. With this limited time period, patients are followed up with small time period. Hence it need to be done in multicentred level and large number of patients with more time of follow up.

## Conclusion

The study developed an early warning scoring system for fever with thrombocytopenia patients, which can be inexpensive, reproducible, and clinically bedside tools. It helps clinicians assess prognosis early, guide interventions, and predict recovery and survival in patients with higher scores.

**Acknowledgments:** The authors would like to thank all of the study participants and the administration of Department of General Medicine, Government Erode Medical College Hospital, Perundurai, and Affiliated under The Tamilnadu Dr MGR Medical University, Chennai, and Tamilnadu, India for granting permission to carry out the research work.

**Ethical statement:** Institutional ethical committee accepted this study. The study was approved by the institutional human ethics committee, Government Erode Medical College Hospital, Perundurai. Informed written consent was obtained from all the study participants and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining

consent. The confidentiality of the study participants was maintained.

**Authors' contributions:** Dr. J.Saravana Priya - conceptualization, data curation, investigation, methodology, project administration, visualization, writing—original draft, writing—review and editing; Dr. S.Rajesh Kumar -conceptualization, methodology, writing—original draft, writing—review and editing; Dr .C.Vignesh - conceptualization, visualization, supervision, writing—original draft; Dr. R.Shanmugasundaram - methodology, writing—original draft, writing, review and editing. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work. All authors have read and agreed to the published version of the manuscript.

**Informed Consent:** Written informed consent was obtained from the participants before enrolling in the study

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