



A STUDY ON INCIDENCE AND CAUSES OF NEW ONSET THROMBOCYTOPENIA IN THE MEDICAL INTENSIVE CARE UNIT IN TERTIARY CARE HOSPITAL.

General Medicine

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ABSTRACT

Background : Thrombocytopenia, defined as a platelet count of $<150,000/\mu\text{L}$, is one of the most common laboratory abnormalities seen in critically ill patients admitted to Intensive Care Unit (ICU); its incidence ranges from 15% to 60% in patients admitted to ICU. It is commonly associated with sepsis, disseminated intravascular coagulation (DIC), massive blood transfusion, and chemotherapy. Thrombocytopenia has also been associated with increased ICU and hospital length of stay and need for organ support. Due to the limited data available in our country, the present study was performed. The main objective is to find the prevalence, causes and outcomes of NOT in ICU. **Materials And Methods:** This is a prospective observational study conducted in the department of General Medicine in Basaveshwara Teaching and General Hospital from 1 August 2022 to 31 January 2024. A total of 105 patients were categorised into cases and controls and outcomes were studied. **Results:** The prevalence of NOT is found to be 23.8%, with most common underlying cause being Sepsis (76%) followed by DIC (8%). There was a significant requirement of ventilatory support and blood product transfusion between the study groups with p-value of 0.031 and 0.029 respectively. The outcomes studied were Acute Kidney Injury and length of hospital stay with significance of 0.003 and 0.005 respectively. **Conclusion:** Thrombocytopenia is one of the commonest findings, frequently encountered in patients admitted to ICU. In an ICU setting thrombocytopenia prevails as a poor prognostic marker with regards to patient outcome. It is commonly associated with multi organ failure, thus requiring detailed evaluation and prompt treatment.

KEYWORDS

Thrombocytopenia, Disseminated Intravascular Coagulation, Sepsis

INTRODUCTION

Thrombocytopenia is defined as absolute platelet count of less than $1,50,000/\text{cumm}$ or a decrement of greater than 50% from baseline value. It is the most common haematological abnormality observed among adults and medical Intensive Care Unit (ICU) patients with the incidence of 13 to 65%⁽¹⁾. In many patients, thrombocytopenia is identified during their ICU stay rather than at the time of admission⁽²⁾.

Thrombocytopenia is considered clinically significant if platelet count is less than $1,00,000/\text{cumm}$ and the risk of bleeding and mortality increases with further decrease in platelet count to less than $50,000/\text{cumm}$. Hence, diagnosis and treatment of the underlying cause is necessary.

Thrombocytopenia is associated with need for prolonged ICU stay, increase in the duration of hospital stay, ventilatory and organ support⁽³⁾. The mechanisms contributing to thrombocytopenia in the ICU include the following: (1) pseudothrombocytopenia, (2) hemodilution, (3) platelet consumption, (4) decreased platelet production, (5) increased sequestration of platelets, and (6) immune-mediated destruction of platelets⁽⁴⁾.

Need for the study: Most of the studies that are done on new onset thrombocytopenia are from the western literature and there is a very limited data available in the Indian scenario. This study was undertaken to analyse the varied presentations of the underlying causes and determines the management modality in the Indian context.

Aims And Objectives

1. To study the Occurrence and causes of new onset thrombocytopenia in the medical intensive care unit.
2. To study the impact of new onset thrombocytopenia on outcomes of critically ill patients in medical intensive care unit.
3. To study the transfusion requirements of new onset thrombocytopenia in the medical intensive care unit.

MATERIALS AND METHODS

This is a prospective observational study performed on the in-patients admitted in Medicine Intensive Care Unit between 1st August 2022 to 31st January 2024 in the department of General Medicine in Basaveshwara Teaching and General Hospital.

Study subjects will be selected after applying inclusion-exclusion criteria. Information is collected through prepared Proforma from each patient.

Inclusion Criteria:

1. All medical patients who were admitted into MICU during the study period
2. Patients with a platelet count $> 150,000/\mu\text{L}$ at time of admission into MICU

Exclusion Criteria:

1. Pregnancy
2. Patient with platelet disorders
3. Patient on anti platelet drugs

A total of 105 patients who came with hemodynamic instability or requiring respiratory support or both were studied. After taking informed consent, detailed history was taken and patients were subjected to complete general and systemic examination and thorough investigations were performed.

Statistical Analysis:

- The statistical data will be compiled using SPSS for windows (version 20.0)
- Chi-square test, Small Sample t-tests will be applied for significance.
- P value of <0.05 will be considered as a significant value.

RESULTS

Among all the 105 patients that are included in the study, 80 patients did not have thrombocytopenia and are taken in the control group. 25 patients with new onset thrombocytopenia are included in the cases group, with an incidence of 23.8%.

Among the patients with NOT, 60% of them were admitted for respiratory support and 16% for hemodynamic optimisation. The average APACHE II score in the NOT group was 16.88 ± 4.93 .

Baseline investigations that were performed on the patients at the time of admission shows significant hypoproteinemia and thrombocytopenia between the study groups (illustrated in table 1).

Table 1: Baseline investigations in both the study groups				
Baseline investigations	Overall	NOT	Without-NOT	t-test value, P-value
	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	
Haemoglobin	11.40 $\pm$ 2.08	11.50 $\pm$ 2.01	11.08 $\pm$ 2.30	t = 0.883, P = 0.379, NS
WBC ($\times 10^3/\text{cumm}$)	13.0 $\pm$ 4.0	12.7 $\pm$ 4.0	13.7 $\pm$ 3.9	t = -1.056, P = 0.293, NS

Platelet	2.75 + 0.77	2.74 + 0.78	2.77 + 0.76	t = -0.153, P = 0.879, NS
Total bilirubin	0.69 + 0.24	0.65 + 0.23	0.82 + 0.23	t = -3.062, P = 0.003, S
Albumin	3.40 + 0.83	3.10 + 0.78	3.49 + 0.82	t = 2.081, P = 0.040, S
Blood urea	36.7 + 17.4	34.3 + 13.9	44.3 + 24.4	t = -2.557, P = 0.012, S
S. Creatinine	1.28 ± 1.28	1.59 ± 1.19	1.19 ± 1.58	t = -1.357, P = 0.178, NS
pH	7.33 ± 0.083	7.31 ± 0.095	7.33 ± 0.075	t = 0.983, P = 0.328, NS

The causes of new onset thrombocytopenia after the admission of the patients into ICU are broadly identified as sepsis associated thrombocytopenia (76%), disseminated intravascular coagulopathy (8%) and unclassifiable (16%).

The requirement of vasoactive drugs and hemodialysis are highest in the patients belonging to NOT group with 72% and 20% respectively. There was statistically significant requirement of ventilatory support and transfusion of blood products are observed between the study groups with p-value of 0.031 and 0.029 respectively (table 2).

Table 2: Treatment requirements in both the study groups

Variables	Categor- ories	Overall	NOT	Without- NOT	P- value
Vasoactive drug requirement	Yes	58 (55.2%)	18 (72.0%)	40 (50.0%)	P = 0.128, NS
	No	47 (44.8%)	7 (28.0%)	40 (50.0%)	
Haemodialysis requirement	Yes	15 (14.2%)	5 (20.0%)	10 (12.5%)	P = 0.349, NS
	No	90 (85.8%)	20 (80.0%)	70 (87.5%)	
Ventilator requirement	Yes	74 (70.5%)	22 (88.0%)	53 (66.3%)	P = 0.031, S
	No	31 (29.5%)	3 (12.0%)	28 (33.7%)	
Transfusion requirement	Yes	25 (23.8%)	10 (40.0%)	15 (18.8%)	P = 0.029, S
	No	80 (76.2%)	15 (60.0%)	65 (81.2%)	

Among the 25 patients who required blood products transfusion, 10 patients belonged to NOT group and the rest of them in without NOT group. The blood products transfusion requirement in overall study population are packed cell (20%), platelet (7%), FFP (5.7%) and cryoprecipitate (1.9%). A significant p-value of 0.032 and 0.010 are noted in groups requiring platelet (SDP or RDP) and Cryoprecipitate (table 3).

Table 3: Transfusion requirements in both study groups

Variables	Categ- ories	Overall	NOT	Without- NOT	P-value
Packed cell	Yes	21 (20.0%)	8 (32.0%)	13 (16.3%)	P = 0.087, NS
	No	84 (80.0%)	17 (68.0%)	67 (83.7%)	
Platelet	Yes	7 (6.7%)	4 (16.0%)	3 (3.8%)	P = 0.032, S
	No	98 (93.3%)	21 (84.0%)	77 (96.2%)	
FFP	Yes	6 (5.7%)	2 (8.0%)	4 (5.0%)	P = 0.573, NS
	No	99 (94.3%)	23 (92.0%)	76 (95.0%)	
Cryoprecipitate	Yes	2 (1.9%)	2 (8.0%)	0 (0.0%)	P = 0.0106, S
	No	103 (98.1%)	23 (92.0%)	80 (100.0%)	
Bleeding manifestations in transfused patients	Yes	6 (5.7%)	3 (30.0%)	3 (20.0%)	P = 0.120, NS
	No	99 (94.3%)	22 (70.0%)	77 (80.0%)	

DISCUSSION

Thrombocytopenia is the most commonly encountered finding in the critical care setup, where it is considered as the poor prognostic indicator of the patient's condition and outcome. It is most commonly associated with multi organ dysfunction and sepsis⁽⁴⁾.

Incidence of new onset thrombocytopenia in our study population is 23.8%. Similar studies were conducted in Hyderabad in 2019 by Narmada Aluru et.al., where, the incidence was found to be 13% to

65%⁽⁵⁾. Another study which was conducted in 2017 in Nagpur by Khurana et.al., incidence was 37.57%⁽⁶⁾. When compared to the study conducted by Phil Hui et.al., the incidence ranged between 13% to 44.1%⁽⁷⁾.

According to a study by Lim et.al., the most common cause of NOT in ICU, was sepsis with DIC in majority (66.7%) of the patients. This study was similar to the present study, where it was 84% combined (sepsis accounted for 76% and DIC was 8%). At Mayo Clinic Medical Center, a cohort study was conducted on 304 patients with sepsis and septic shock. 93.7% of the patients were diagnosed with septic shock, most common reason for sepsis being pneumonia⁽⁸⁾.

In the present study, 25.3% of the patients required blood products transfusion with statistically significant (p-value of 0.029) result noted between both the study groups. The majority of the blood product that was transfused were packed cells (20%) followed by platelets (6.67%). When compared with the study by Anthon et.al. in 2023, blood product transfusion was observed in the study population (critically ill) in ICU, where platelet transfusions were observed in 22.6% of them, which is higher than the present study⁽⁹⁾.

Thrombocytopenia is one of the commonest findings, frequently encountered in patients admitted to ICU. In an ICU setting thrombocytopenia prevails as a poor prognostic marker with regards to patient outcome. It is commonly associated with multi organ failure, thus making the management complicated.

Early diagnosis and prompt treatment will help in reducing the morbidity and mortality of the patients with sepsis and DIC.

The prevalence of major bleeding events such as mucosal bleed is also higher in thrombocytopenic patients. Previous studies have shown that thrombocytopenia is itself a reliable prognostic marker for mortality; furthermore, declining platelet levels during the ICU stay also serves as independent prognostic markers for mortality.

Strengths of the present study include:

1. This is prospective study conducted in the ICU setup of the hospital, hence, the patient follow up and management can be observed.
2. There is precise data collection and also helps in auditing the cases to develop prevention or treatment protocols.

Limitations of the present study include:

1. Study was limited to a restricted study period and study group.
2. Due to a less sample size, results differ from the larger groups.
3. Results cannot be used for the general population, as the study group includes only the patients attending our hospital.
4. In few patients, cause of NOT couldn't be classified, hence, requires further extensive approach to evaluate the cause and management of the patients.

SUMMARY AND CONCLUSION

Thrombocytopenia is one of the commonest findings, frequently encountered in patients admitted to ICU. In an ICU setting thrombocytopenia prevails as a poor prognostic marker with regards to patient outcome. It is commonly associated with multi organ failure, thus requiring detailed evaluation and prompt treatment.

The mortality of the study population in the ICU signifies the severity of the disease and suggests further evaluation and management of the condition and to prevent further progression of disease, to reduce morbidity and mortality.

With all the information obtained, there need not be further research conducted to evaluate the disease progression, prevent the complications and also to implement strategies to further reduce the morbidity and mortality of the patients with respect to new onset thrombocytopenia.

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