



SIGNIFICANCE OF PLATELET COUNT AND INDICES IN BURN PATIENTS AT A TERTIARY CARE CENTER

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ABSTRACT **Background:** Burn injuries constitute a major health concern in India and it ranks second in having high mortality, disfigurement and morbidity. The significance of platelet count as a prognostic factor in burns has been shown by many studies. But studies on Platelet indices in burns patient are limited. **Aim:** The aim of study is to see the significance of platelet count and other platelet indices in burn patient. **Method:** Study was conducted in department of pathology, VAMC, Shahjhanpur from October 2021 to October 2022. All adult patients >18yrs and <60yrs of age were included in the study. After proper resuscitation and dressing, blood samples were sent for investigations and all patients were divided into two groups: group (A): TBSA <30% and group (B): TBSA >30%. Investigations were repeated on day 4th, 7th and 14th and the mean platelet count and indices were compared between the two groups. **Results:** Of the 65 patients in study, 35 belonged to group A and 30 to group B. Platelet count increased gradually in the group A, but decreased in the group B. Platelet count was significantly different on the 7th and 14th day comparing group A and B according to the severity of injury; platelet count was lower in group B (P < 0.05). When the 4th day was compared to the 1st day, a platelet count decrease was observed in both groups, but was significant only in group B. **Conclusion:** A decline in platelet count is a poor prognostic factor. The outcome of burns patients can be improved by giving appropriate and timely treatment. Rebound rise in platelet count on the subsequent post-burn days occurs in group A while declining trend is maintained in patients of group B. Thus the monitoring of the platelet count is of great importance during the resuscitation and care of severely burned patients.

KEYWORDS : burn injury, total body surface area percentage, platelet count, platelet indices

INTRODUCTION

Burn injuries constitute a major health concern in India and it ranks second in having high mortality, disfigurement and morbidity¹.

Platelets play a crucial role in severe hemostasis disorders and immune reaction impairments in burn patients. Platelets are small fragments of megakaryocyte cytoplasm, which play a fundamental role in primary and secondary hemostasis, as crucial reactions of the coagulation cascade occur on their phospholipid surface².

Thrombocytopenia usually occurs early and can be an early indication of bacteremia in burn patients³⁻⁶. Long before in 1966, it was studied by Cohen and Gardner the relationship between the platelet count, WBC and burn injury. He observed marked decrease in platelet count⁷ and concluded that effect of bacteria and their endotoxins cause early depletion of platelet reserve leading to thrombocytopenia and bone marrow depression. In another study by Robb HJ in 1967 his study of Dynamics of microcirculation during burn suggested that thrombocytopenia occurs due to huge consumption of platelets by formation of precipitates and micro thrombi in arterioles and venules⁸.

In 1993 Housinger TA³ et al studied the relationship between platelet count, sepsis and survival of the burn patients. It was suggested by him that in septicemia platelet count decreases at very low level of stimulus which is insufficient to induce other inflammatory responses⁹. Once the patient develops septicemia, it affects almost all the organ systems of the body, leading to systemic inflammatory response syndrome, resulting in multiple organ dysfunction syndrome with death as an ultimate effect.

Thus, burn patients can only be rescued in early stage of septicemia before the occurrence of irreversible harm to various organs. Declining platelet count occurs very early in septicemia even before clinical signs and symptoms develop. This requires the presence of sensitive parameters which can detect septicemia in its early phase, so that early detection and institution of treatment can save the life of burn patients.

The significance of platelet count as a prognostic factor in burns has been shown by many studies². But studies on Platelet

indices in burns patient are very few. The Platelet indices are calculated by the automatic hematology analyzers. MPV means average volume of a single platelet. PDW is the amount of changes in the size of the platelets. Plateletcrit (PCT) is the total volume of platelets per unit volume of blood.

So current study was conducted to assess the role of platelet count and platelet indices in burn patients.

MATERIALS AND METHODS

Study was conducted at Clinical Pathology lab, Department of Pathology, VAMC, Shahjhanpur from October 2021 to October 2022. Soon after the patient was admitted in the burn unit, proper resuscitation, dressing was done. Antibiotics, analgesics and fluids were started accordingly. Every patient was subjected to haematological investigations including platelet count & platelet indices.

Inclusion Criteria: Patients who sustained burn injuries and admitted in burns ward were included in the study.

Exclusion Criteria: Age less than 18years and > 60years, Electrical burns, scalds and patients with known hematological disorders were excluded from the study.

Sampling Method: 65 patients were included in this study. Cases with >30% total burn surface area are included under group B and rest were included under group A (TBSA <30%).

Sample Collection: Blood samples were collected in EDTA coated vacutainers from the cases on the day of admission, on 4th day, on 7th day and on 14th day of admission. After gentle thorough mixing, the samples were analysed within one hour of collection using hematology analyser. The Platelet count and indices were noted. Patients details like age, sex, Total Burns Surface Area (TBSA) and presence of inhalational injuries were obtained from case sheet. The results were entered in excel sheet and the platelet indices were compared among the two groups.

RESULTS

In current study duration, a total of 125 burns patient were admitted in the hospital. By sticking to the inclusion and exclusion criteria, 65 patients were included in the study. 35

patients were classified under group A and 30 under group B.

Age-

The mean age of patient in this study is 29.4yrs and most of the patients belonged to age group 18-30 years as shown in Table1. No significant difference was observed in patients age (p = 0.840) comparing group A and B as per their severity of burn injury.

Table1: Showing Age distribution in both the groups

AGE GROUP	GROUP A	GROUP B
18-30years	13	06
31-40years	09	10
41-50years	09	09
>50years	04	05

Gender-

A total of 35 burn patients were included in group A and 30 were included in group B. Out of total 35 patients in group A 27 were male and 9 were female while in group B, 17 were male and 13 were female as shown in Table2. But no significant difference(p>0.05) was observed in patients gender distribution in two groups.

Table 2: Showing Gender distribution in both groups

GENDER	GROUP A	GROUP B
MALE	27	17
FEMALE	09	13
TOTAL	35	30

Platelet count and other platelet indices-

Comparing Platelet count and other platelet indices of burns patient between the two groups, following observations were made:

Group A (TBSA<30%):

Mean platelet count in group A was 242 ± 73 on day1 and on day 4 there was slight decline and then it showed a continuous rise on day7 and day 14. All other indices mean MPV, mean PDW and mean PCT showed a sheer rise from day1 to day14 as shown in Table3.

Group A patients showed a decrease in platelet count in the initial post-burn days followed by rise in platelet count to the normal level on subsequent post-burn days.

Group B (TBSA>30%):

Mean platelet count in group A was 261 ± 97 on day1 and then there was decrease in mean platelet count on day 4, 7 and day 14 but there was a slight increase in between on day 7 from day4. While other platelet indices like mean MPV and mean PDW showed a sheer rise from day 1 to day 14 but mean PCT values which showed a slight rise on day7 from day4 and then again decreases on day14 quiet similar as the mean platelet count as shown in Table3.

On the first day, the difference between the mean values of platelet count in group A and B was statistically significant (p<0.05). A decrease in platelet count was observed in both the groups on day4 as compared to day1 but was statistically significant in group B only. Significant difference in platelet count was revealed on the 4th, 7th and 14th days during monitoring in burn patient groups according to the severity of injury.

Table 3: Showing Mean platelet count and other indices in both the groups

	Mean Platelet Count	Mean MPV(fl)	Mean PDW(fl)	Mean PCT (%)
GROUP A	242 ± 73	9.71	10.64	
Day1				0.24
Day4	222 ± 56	9.80	10.81	0.21
Day7	296 ± 91	10.64	10.90	0.29
Day14	325 ± 148	10.89	11.94	0.3

GROUP B	261 ± 97	09.88	11.43	
Day1				0.26
Day4	224 ± 65	10.12	11.87	0.22
Day7	240 ± 92	10.24	12.02	0.24
Day14	155 ± 179	11.21	12.21	0.15

DISCUSSION

There are many prognostic factors that determine the outcome of burns which include age, sex, presence of inhalational injuries, bone fractures and comorbid conditions like heart disease and Diabetes Mellitus. The most important prognostic factor followed till now are Total Burn Surface Area (TBSA).

In this study, it was found that most patients of burn injury belonged to the age group of 18–30 years and in group B female were relatively more than in group A. Social customs and problems like dowry might be the main factors in the young female population.

Previous studies & investigations regarding platelet count & its use as a prognostic indicator in the patients of burn have been clearly established. The study of platelet count is not only helpful in understanding the clinical course of the burn patient but also in monitoring the efficacy of the treatment & the prognostic outcome of the diseased¹⁰.

In this study, every burn patient was followed up for 14 days (no death occurred) and behavior of platelet count and indices was studied. In group B, declining trend in platelet count was observed with development and progression of septicemia. Thus, this declining platelet count can be correlated with bad prognosis of patients. Similar findings of low platelet counts (indicating thrombocytopenia) were associated with increased mortality risk in adult patients with massive burns¹¹.

On the first day, the difference between the mean values of platelet count in group A and B was statistically significant (P00.045). Similarly on 4th, 7th and 14th days, the difference between the mean values of platelet count in group A and B was statistically significant. Reason behind this is the gradual increase in platelet count in patients of group A and gradual decrement in platelet count in patients of group B with occurrence and progression of septicemia more in moderately or severely burned patients which is in accordance with study by others^{12,13}.

In this study group A patients do not show much difference in the platelet indices but group B patients showed significant changes in all platelet indices. In both the groups A and B, Mean MPV and PDW showed rise on consecutive days indicating platelet activation which is comparable to other study¹⁴.

Therefore this study shows that declining platelet count and rising MPV in the successive blood test monitoring signal poor prognosis and the patients should be evaluated further and proper management should be taken that can alter the rate of survival of the burn patients.

CONCLUSION:

Correct treatment at correct time remains the only thing to cut down death rate due to burn injury. Platelet count and other indices which can be easily assessed from simple haematological investigation in the automated analyzer serve as a prognostic factor and predict the severity at an early stage. Rebound rise in platelet count on the subsequent post-burn days occurs in group A while declining trend is maintained in patients of group B. Thus the monitoring of the platelet count is of great importance during the resuscitation and care of severely burned patients.

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