

## Role of Platelet Count in Predicting Outcome in Burn Patient –A Prospective Study

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**Abstract:** Skin an anatomical barrier from pathogens and damage between the internal and external environment in bodily defense; Langerhans cells in the skin are part of the adaptive immune system. Loss of skin in burn patients lets them open to a wide variety of infectious organisms. This also depends on the extent of the body surface area, degree of the burn, immune capacity of the patient, etc.. In this study we attempt to find the correlation between the platelet count and its usefulness in predicting outcome in burn patients. Septicemia is one of the leading causes of death in burn patients. Through this study we aim for commencement of timely vigorous treatment against it. Septicemia is the most important cause of mortality in burn. Burn patients can only be saved if septicemia is detected early which requires very sensitive prognostic indicator. Studies investigating the role of platelets and platelet count in burn patients are rare, rather old and mostly presenting case reports.

**Keywords:** Burn, Platelet count, Septicemia.

### I. Introduction

According to WHO about 265 000 estimated deaths that occur every year are caused by burn. Of which almost half occur in the WHO South-East Asia Region. There are about 1 million burn cases in India every year<sup>(1)</sup>. Timely care and management of the burn patients are required to save the life of the burn patients.

In burn patients, bacterial invasion is not unexpected. It has been reported that, despite antibiotics without topical therapy, burn wound can contain up to 100 million organisms per gram of tissue after 2 days of injury<sup>(2)</sup>. It is estimated that about 65% of the deaths in burn patients is caused by septicaemia<sup>(3)</sup>. The study of recent decades had found that the platelets changes have close relationship with diseases and drugs<sup>(4)</sup>. Early detection of the deterioration of the patient and prompt treatment will help in saving the life of the patient.

### II. Study Materials And Methods

This study conducted between Sep.2014 to Sep.2015 in the Department of General Surgery, CMC-H - Burn unit, aims in finding the correlation between the post burn septicaemia and platelet count, and other factors which influence platelet count.

#### 2.1. Inclusion & Exclusion Criteria

- ◆ All burn patients who are more than 18 years of age and have sustained burn between 20% to 50% of total body surface area.
- ◆ All the burn patients above 50% are excluded from this study as they have high mortality rate mostly because of hypovolemia and die before developing septicaemia.
- ◆ All burn patients below 20% is excluded as they have very less chance of developing septicaemia.
- ◆ All paediatric age group patients are excluded due to very less number of patients less than 18 yrs age will get admitted in our burn department.
- ◆ Only those who were admitted within first 12 hrs. of the incident and fulfil the inclusion criteria were taken into account.

#### 2.2. Evaluation

A detailed clinical history will be taken for all the patients. Thorough physical examination will be done for all the patients. Patients will be evaluated for the extent of burn body surface area and the degree of burn. Routine blood investigations, temperature of the patient, PTR chart, and blood culture sensitivity. Antibiotic cover for the patients and routine dressing. Routine platelet count is done on 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup> & 7<sup>th</sup> day. Following a standard protocol<sup>(5)</sup>, blood culture is sent for all the patients who fit the criteria and appropriate antibiotics were started based on the culture sensitivity reports. Evaluation of platelet count and its significance in early detection of post burn septicemia will be individually analysed for all patients.

### III. Results & Observations

#### 3.1. Trend of platelet count in survivors & non-survivors:

No. of Patients included in the study : 157

No. of survivors in this study : 91

No. of non-survivors in this study : 66

Post burn days	Survivor's Group Platelet Count in lakhs	Non survivor's Group Platelet count in lakhs.
1 <sup>st</sup> day	1.98	1.87
3 <sup>rd</sup> day	2.08	1.83
5 <sup>th</sup> day	2.17	1.67
7 <sup>th</sup> day	2.26	1.5

**Table 1:** Post Burn Day & Platelet count. (count in  $\times 10^5$ )

On comparing the platelet levels in the survivors and non survivors, a gradual increase in trend of the platelet count was observed in the survivors group. A gradual decline in the platelet count was observed in the non survivor group. This trend was not influenced by the extent of the burn injury. There is no significant difference in the platelet levels in the survivor and non survivor group on the first post burn day. The difference in the platelet levels was significant on the 5<sup>th</sup> and the 7<sup>th</sup> post burn day.

#### 3.2. Inhalation Injury and platelet levels:

Total number of pts. with inhalation injury :33

Total number of pts. without inhalation injury :124

Mean platelet count among the inhalation group : 1.81

Mean platelet count among the non-inhalation group: 2.01

In our study of 157 patients about 33 patients had inhalation injury. On comparing the platelet count between the patients with inhalation injury and those without the inhalation injury a lower mean platelet count in those with the inhalation injury was observed.

#### 3.3. Septicemia and survivability:

No. of survivors in this study : 91

No. of patients with positive blood culture among survivors : 34

That is roughly 37.5%

No. of non-survivors in this study : 66

No. of patients with positive blood culture among non –survivors : 44

That is roughly 67%

The incidence of septicemia in the non survivor group is higher when compared with the incidence of septicemia in the survivor group . Total number of patients with positive blood culture report is 78.

Pseudomonas	29
Klebsiella	22
Staph. Aureus	18
Proteus	12
E.coli	12
Acinetobacter	8
Others	15
Mixed	31

**Table 2:** Organisms Causing Septicemia

The most common organism in causing septicemia in the burn patients is Pseudomonas sp. Others organisms which caused septicemia are Klebsiella, E.coli, Proteus, Acinetobacter sp., Staphylococcus aureus.

#### 3.4. % TBSA burnt & Survivability:

% of TBSA	20-29	30-39	40-50
Died	6	11	49
Survived	32	29	30
Total	38	40	79

**Table 3:** % TBSA burnt & Survivability

The survivability was higher with younger age and with lower %TBSA burnt. The survival was higher in the 1<sup>st</sup> & 2<sup>nd</sup> degree burn when compared with the 3<sup>rd</sup> degree burn.

#### IV. Discussion

There are many studies done with the aim of early identification of septicemia. Platelet index is an important lab finding that can be used in the diagnosis of sepsis. It is established that in sepsis patients with greater than 18 % Platelet Distribution Width have a greater risk of death <sup>(6)</sup>. In this study we try to find the relation between the platelet count and prognosis in septicemia.

On comparing the platelet levels in the survivors and non survivors a gradual increase in trend of the platelet count was observed in the survivors group and a gradual decline in the platelet count was observed in the non survivor group. This trend was not influenced by the extent of the burn injury. Though the exact mechanism of thrombocytopenia in septicemia is uncertain there are a few theories that try to explain this fall in the platelet levels in septicemia. Its rapid onset suggests that there is increased platelet destruction, a mechanism that is supported by the results of platelet survival studies reported by others previously <sup>(6)</sup>. Another possible mechanism is due to overt or possible sub clinical DIC.

In our study we observed that there is no significant difference in the platelet levels in the survivor and non survivor group on the first post burn day but the difference in the platelet levels was significant on the 5<sup>th</sup> and the 7<sup>th</sup> post burn day. This platelet count was the lowest in the non survivor group just before their death. This fall in the platelet levels was steepest prior to death.

There are many factors that can influence the platelet count other than septicemia in the burn patients. One of the most important is inhalation injury. Even with early identification and prompt management of septicemia, the proportion of death caused by inhalation injury is high. In our study of 157 patients about 33 patients had inhalation injury. All the patients with inhalation injury succumbed to it with in 5<sup>th</sup> post burn day despite early intubation and proper management. On comparing the platelet count between the patients with inhalation injury and those without the inhalation injury a lower mean platelet count in those with the inhalation injury was observed.

The incidence of septicemia in the non survivor group is higher about 67 % when compared with the incidence of septicemia in the survivor group 37.5%. This cause of septicemia may be due to direct invasion of the organisms from the burn wound or also due to pulmonary infection, urinary tract infection, etc. The most common organism in causing septicemia in the burn patients is Pseudomonas sp. It is generally observed that the mortality rate among those with Staphylococcus aureus was comparatively higher when compared with other organisms.

The survival was higher in the 1<sup>st</sup> & 2<sup>nd</sup> degree burn when compared with the 3<sup>rd</sup> degree burn. Also the survivability was higher with younger age and with lower % TBSA burnt. The incidence of burn injury was found to be common in the age group of 20 to 45 yrs. Moreover it was more common in males than in females.

#### V. Conclusion

Skin a highly dynamic organ, its function as anatomical barrier can be best observed from the burn injury. In this study we found that the fall in the platelet count is associated with bad prognosis in burn patients. Once septicemia sets in, almost all organ systems of body are affected and induce systemic inflammatory response syndrome followed by multiple organ dysfunction syndrome with death as an ultimate effect. The routine monitoring of platelets will help in the early identification of septicemia thus giving us an early start in the management of septicemia and potentially saving the patient's life.

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**Note:** This study is a partial work of my dissertation , titled "PLATELET COUNT AS A PROGNOSTIC INDICATOR IN BURN SEPTICAEMIA"

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