Original Research Paper

Emergency Medicine

A STUDY OF PLATELET INDICES AND THEIR EFFECT ON MORBIDITY AND MORTALITY IN HOSPITALIZED PATIENTS WITH SEPSIS

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ABSTRACT **Introduction** – Platelets are important immunomodulators and are implicated in the pathogenesis of sepsis syndrome and organ failure. Thrombocytopenia is a common manifestation of severe infection and sepsis. They can serve as prognostic indicators. The current study aims to determine the usefulness of platelet indices as indicators of morbidity and mortality in sepsis.

Results- Out of the 154 patients, 72 were females and 82 were males. 126 patients needed ICU stay and 22 patients expired during the hospital stay. Mean platelet counts were lower in patients requiring ICU and those who expired. MPV and PDW were higher in the same groups. However, the differences were not statistically significant.

Discussion – There are inconsistencies in the literature regarding platelet indices during sepsis. Some of the studies noted thrombocytopenia in severe sepsis cases with a statistically significant difference. While MPV and PDW are shown to be elevated in severe cases, they failed to have a consistent effect on mortality.

Conclusion- The current evidence doesn't support the use of platelet indices at least at the time of admission to the emergency department. Serial monitoring may prove useful to predict prognosis.

KEYWORDS :

INTRODUCTION:
Sepsis is defined as the systemic response to infection and is associated with a significant mortality rate. Platelets play an important role in inflammation and host response. Thrombocytopenia is part of multi-organ dysfunction syndrome. About 23% of hospitalized patients with sepsis have thrombocytopenia. Platelet dysfunction during sepsis has been shown to correlate with a poorer prognosis. Thus, the number, morphology, and function may be used as biomarkers for risk stratification of patients with sepsis.

The objectives of the study were to determine the role of platelets in the morbidity and mortality of sepsis patients

Methodology (Materials & Methods): This is a retrospective observational study conducted over a period of 1 year in the Dept. of Emergency Medicine, PESIMSR hospital, Kuppam**.** All consecutive patients presented to the emergency department with the diagnosis of sepsis syndrome using purposive sampling. An informed consent has been obtained from each of the participant willing to participate in the study. Institutional ethical committee approval has been obtained prior to initiating the study.

Inclusion And Exclusion Criteria

Inclusion Criteria: all adult patients with a diagnosis of sepsis

Exclusion Criteria: all pediatric patients

All consecutive patients presenting to the dept. of emergency medicine were enrolled in the study. Data was entered into master sheets and analyzed using the trial version of SPSS.

RESULTS
A total of 154 patients have been enrolled. There were 82 males and 72 females. The Majority of the patients had SIRS scores of 2 (35.1) and 3(35.1) while scores of 1 and 4 are seen in a minority of patients. Fever, cough, and breathlessness (10.4%) are found to be the most common presenting features, followed by fever and cough (9.1%), and other features in a minority of cases. Lower respiratory infection (23.4%) was found to be the most common diagnosis, followed by viral sepsis, meningitis, cellulites, acute GE, and urinary tract infections in that order. The Mean age at the time of presentation was 54.73±14.618 with a range from 20 to 87 years. The Mean platelet count was found to be

241.12±148.745 with a wide variation from 11000 to 675000. The Mean platelet distribution was found to be 17.001±0.9382. Mean platelet volume ranged from 6.2 to 13.6 with a mean of 8.80±1.36. 126 patients needed ICU stay, while 28 patients could be managed in a non-ICU setting. The Average length of ICU stay was 3.3 days, while the average length of hospital stay was 7.44 days. 22 patients expired during the hospital stay. The values for the platelet indices are shown in the table. All the platelet indices failed to statistically significant difference either for predicting ICU stay or in-hospital mortality.

Table 1- Comparison of parameters between ICU group vs non-ICU group

Indicator	ICU group	non-ICU group	P-value
Platelet count	235.06±147.476	270±153.3779	0.2614
Mean platelet volume	8.8257±1.215	8.714±1.9206	0.6981
Platelet distribution width	16.992±0.8961	17.043±1.1257	0.7957

Table 2- comparison of platelet indices between survivors and non-survivors

Indicator	survivors	non- survivors	P-value
Platelet count	244.79±155.66	221.18±97.671	0.4925
Mean platelet volume	8.7579±1.39	9.09±1.1779	0.3196
Platelet distribution width	16.952±0.9313	17.3±0.9452	0.1075

DISCUSSION
Sepsis is a syndrome of deregulated immune response to infection. It also involves non-immune responses in the neuroendocrine, cardiovascular and metabolic pathways. Mortality in sepsis is in the range of 20 to 50% [1]. One study has quoted mortality as high as 63% [2]. Sepsis leads to multiorgan failure due to endothelial dysfunction and micro vascular occlusion. Vascular occlusion is caused by the formation of micro vascular thrombi. Both platelets and coagulation cascade. Thrombocytopenia is the most common hematological abnormality in sepsis patients [3]. Platelet count is a part of the SOFA scoring system which is used to assess sepsis prognosis based on organ system failure [4].

The current study intends to explore the usefulness of platelet indices like platelet count, mean platelet volume, and platelet distribution width at the time of admission to prognosticate patients with sepsis and septic shock.

There were 154 patients fitting the diagnosis of sepsis and septic shock

during the study period. 82(52.24) were males and 72(46.753) were females. A review article by marc moss states that there is a small male predominance (58.8%) in sepsis cases. In another study conducted in Australia and New Zealand found similar male predominance (59.8%) [5]. A French study has found that incidence in men is twice that in women [6]. A similar statistically significant male predominance has been noted in the current study. This male predominance can be explained in the fact that men have more co-morbidities leading to immunosuppression making them vulnerable to serious infection. Alcoholism which is more prevalent in males also predisposes them to serious infections [5].

Age is another predominant determinant of the occurrence of sepsis and mortality due to sepsis and MOF. The current study had an age range from 20 to 87 years with a mean age of 54.73±14.618 at the time of presentation. Although patients of any age can develop sepsis, it is most common in those above 50 years of age [5, 6]. Co-morbidities especially diabetes also play an important role in the occurrence of sepsis. Multiple older studies have proven this fact which is reflected in the current study.

The current study used both SIRS and qSOFA for the detection and prediction of intensive care admission. Presenting features varied based on the source of infection. Fever is the most frequent presenting complaint. Cough, breathlessness, leg swelling, abdominal pain has been the associated features. The current study has found that lower respiratory infection (23.4%) was found to be the most common diagnosis, followed by viral sepsis, meningitis, cellulites, acute GE, and urinary tract infections. A study published in the world journal of emergency medicine [7] has found that infections of the lung, gastrointestinal tract, and urinary tract infections as the most common site of infection. There are reports that the site of infection influences sepsis outcome. The Pulmonary source of infection had the worst outcome compared to other sites.

Total platelet was found to be higher in the non-ICU group (270±153.779) vs. the ICU group (235±147.476), but the difference was not statistically significant. Mean platelet volume and platelet distribution width also didn't show a statistically significant difference between the two groups, although their mean values were higher in the non-ICU group.

22 patients expired during the hospital stay. Mean platelet counts were relatively lower in the expired group compared to the survivor group. MPV and PDW were higher in the expired group. But again, they failed to show a statistically significant difference. One study evaluating the platelet indices in patients with sepsis and a control group has found that sepsis patients had a lower platelet count, higher MPV, and higher PDW. The current study contradicts these findings. Although no control groups have been used, the mean parameters lie within normal laboratory values [9, 12]. Another study evaluating the effect of sepsis on platelet indices over the course of the disease didn't notice any significant difference in MPV and PDW. However, they noticed a decreasing trend in platelet count, plateletcrit especially in the non-survivor group. Another study [10] from Africa has found that there are significantly lower levels of platelet indices in patients with severe sepsis compared to those with sepsis. Another study evaluating platelet indices at the time of admission to the emergency department showed that MPV, PDW, and PLR were higher in the deceased while the platelet counts were higher in the survivors [14]. Although platelet indices did not prove to be useful in adult patients, they have been important indicators in culture proven sepsis cases. [11, 13]

Based on these findings there is an inconsistent trend on the usefulness of platelet indices as prognostic indicators in sepsis. Alteration in platelet count seems to be more pronounced in viral sepsis and later course of the disease. Bacterial diseases do not seem to cause pronounced platelet abnormalities.

CONCLUSION
Platelets are important immunomodulators that are implicated in the pathogenesis of sepsis syndrome and multiorgan failure. Platelets are implicated in the formation of micro vascular thrombi leading to reduced counts. Platelets are part of the SOFA score for predicting prognosis in sepsis. Changes in platelet indices through the course of the disease may prove a useful predictor of mortality. With currently available evidence, platelet indices may not be useful as prognostic indicators. Further large-scale clinical trials are required to evaluate platelet indices as prognostic indicators in sepsis.

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