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Frequency of Thrombocytopenia and Its Role in Predicting Mortality Among Patients with Sepsis

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Author`s Contribution

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A B S T R A C T

Background: Sepsis is a life threatening disorder caused by systemic infection and commonly causes organ failure. The reduction of platelet count is also known as thrombocytopenia and is common among septic patients. Although it has been known to be associated with poor clinical outcomes, its precise effect in predicting mortality among sepsis patients has not been clearly established and therefore further study is needed.

Objectives: To determine the prevalence rate of thrombocytopenia among sepsis patients and its prognostic value in mortality prediction, and to determine thrombocytopenia as a useful tool to predict mortality risk in clinical practice.

Place and duration of study. From 01 August 2025 to 31 January 2026, Medicine Department, Sandeman Provincial Hospital / Bolan Medical Complex Hospital Quetta.

Methodology: This was an observational type of study where 100 patients with sepsis were found at a tertiary care hospital. Demographic information, clinical variables, platelet counts, and patient outcomes were obtained. The platelet counts were classified as mild (100,000-149,000/µL), moderate (50,000-99,000/µL), and severe thrombocytopenia (less than 50,000/µL). Chi-square tests were used to compare platelet counts in non-survivors and survivors, and multivariate logistic regression was used to establish thrombocytopenia as an independent predictor of mortality. The age of the participants was 58.4 years (SD = 13.2). The main endpoint was in-hospital mortality.

Results: A total of 100 sepsis patients were included, with a mean age of 58.4 years and 65% males. Thrombocytopenia was present in 68% of patients, most commonly mild. Mortality increased with thrombocytopenia severity, reaching 68% in severe cases. Severe thrombocytopenia was an independent predictor of in-hospital mortality. Older age and ICU admission were also significantly associated with increased mortality, while hypertension was not an independent risk factor.

Conclusion: Thrombocytopenia is highly prevalent among sepsis patients and significantly associated with increased mortality. The severity of thrombocytopenia, particularly in severe cases, serves as an independent predictor of in-hospital mortality. Additionally, older age and ICU admission are significant factors linked to poorer outcomes. These findings highlight the importance of monitoring platelet counts in sepsis patients and considering thrombocytopenia as a useful prognostic tool in clinical decision-making.

Keywords: Thrombocytopenia, Sepsis, Mortality, Prognosis

Introduction

Sepsis, which is a life-threatening organ dysfunction due to dysregulated host response to infection, is one of the greatest public health issues. It is linked to a high morbidity, mortality and medical expenditure all over the world [1]. The complexity of the pathophysiology of sepsis adds to the burden of sepsis worldwide because it consists of systemic inflammation, abnormalities in coagulation, and endothelial dysfunction. Although there have been improvements in the management of sepsis, the mortality rate has been unacceptably high among critically ill patients. Hematological abnormalities, which are often evident in patients with sepsis, like thrombocytopenia, are considered to be one of the critical factors affecting patient outcomes [2,3]. A common complication in sepsis is thrombocytopenia, with a platelet count of under 150,000 /µL. The platelets are important in the process of the coagulation cascade and immune response, and their depletion can lead to increased bleeding .The pathogenesis of thrombocytopenia in sepsis is multifactorial as it encompasses bone marrow suppression, elevated platelet consumption as a result of disseminated intravascular coagulation (DIC) and platelet aggregation at the sites of inflammation. Severe thrombocytopenia can also cause thrombotic microangiopathies, which expose an individual to unfavorable experiences. The exact correlation between the extent of thrombocytopenia and the

mortality of patients with septic shock, however, is not delimited [4,5]. It has been indicated by several study works that thrombocytopenia is linked with the adverse prognosis of many acute conditions, such as sepsis. But there is contradictory information in terms of its ability to serve as a good predictor of death among septic patients [6]. According to some studies, thrombocytopenia can be used as an indicator of the severity of the disease, whereas other study believe that this process could indicate the body's reaction to an infection or the formation of complications, such as DIC. Considering the incongruent results and the necessity of more significant evidence, the current study aims to examine the prevalence of thrombocytopenia in sepsis patients and its possible predictive importance to death [7,8]. The potential of thrombocytopenia to be a prognostic marker in sepsis may be useful in the clinical decision-making process. Monitoring platelet counts would help in screening high-risk patients early enough and thereby initiating timely interventions if this is proven [9]. Thrombocytopenia predicts mortality, which might also affect the treatment of such patients (platelet transfusion or anticoagulant use in case of a patient at risk of bleeding or thrombosis).

Methodology

It was a prospective observational study, which was carried out in a tertiary care hospital. In the study, the purpose was to test the prevalence rates of thrombocytopenia in patients with sepsis and how it predicts mortality.

The sample size of 100 patients diagnosed with sepsis according to the International Sepsis Definitions was used. They were patients who were referred to the intensive care unit (ICU) or medical wards within one year. Each patient was recorded based on their demographic features, clinical data, and laboratory values. In the study, both males and females were involved, and they had to meet the sepsis criteria.

The estimation was based on the mortality rate of 30% in patients with thrombocytopenia in sepsis to determine the sample size. The sample size was also calculated to be 100 patients with a confidence level of 95 and a margin of error of 5. This calculation will give a statistical power to identify significant differences between thrombocytopenic and non-thrombocytopenic groups.

Inclusion Criteria

The patients who are adults and aged 18 years and older diagnosed with sepsis according to the Sepsis-2 criteria.

Exclusion Criteria

The study excluded patients with underlying hematologic conditions, patients who were actively bleeding, had severe hepatic impairment, or had had any immunosuppressive therapy within 30 days.

Clinical signs were used to diagnose all patients, and confirm the diagnosis with microbiological evidence or the criteria of organ dysfunction (Sepsis-2). Early goal-focused therapy, antibiotics, fluid replacement, and supportive care were some of the management strategies. The count of platelets was also taken to determine the severity of thrombocytopenia and make management decisions.

The SPSS software (version 25) was used to perform the statistical analysis. Demographic and clinical characteristics were presented using descriptive statistics. The mortality rates of the thrombocytopenic and non-thrombocytopenic groups were compared using the chi-square test. The independent impact of the thrombocytopenia on mortality, with the adjustment of confounding factors, was measured by means of multivariate logistic regression.

Results

The study included 100 patients diagnosed with sepsis, with 68% of them presenting thrombocytopenia, defined as a platelet count below 150,000/μL. Thrombocytopenia was more common in patients admitted to the intensive care unit (ICU), with 75% of ICU patients having low platelet counts. The demographic breakdown included a mix of males

Table 1: Demographic and Clinical Characteristics of Study Participants

Characteristic	Total (n = 100)	Thrombocytopenic (n = 68)	Non-Thrombocytopenic (n = 32)
Age (Mean ± SD)	60 ± 12	62 ± 11	58 ± 13
Gender			
- Male (%)	55.00%	55.88%	53.13%
- Female (%)	45.00%	44.12%	46.88%
Comorbidities			
- Diabetes Mellitus (%)	31.00%	35.29%	21.88%
- Hypertension (%)	25.00%	27.94%	18.75%
- Chronic Kidney Disease (%)	21.00%	23.53%	15.63%
Severity of Sepsis			
- Severe Sepsis (%)	46.00%	50.00%	37.50%
- Septic Shock (%)	54.00%	60.29%	40.63%

Table 2: Mortality Rates in Thrombocytopenic and Non-Thrombocytopenic Groups		
Group	Mortality (%)	p-value
Thrombocytopenic (n = 68)	54.4%	< 0.05
Non-Thrombocytopenic (n = 32)	15.6%	

and females, with patients' ages ranging from 18 to 85 years. The mortality rate for thrombocytopenic patients was significantly higher compared to non-thrombocytopenic patients. Of those with thrombocytopenia, 54.4% died, while only 15.6% of the non-thrombocytopenic group succumbed to sepsis. This difference was statistically significant ($p < 0.05$) as confirmed by the chi-square test. Multivariate logistic regression analysis revealed that thrombocytopenia was an independent predictor of mortality in sepsis patients, with an odds ratio of 4.12, indicating that thrombocytopenic patients were over four times more likely to die than non-thrombocytopenic patients, even after adjusting for age, comorbidities, and sepsis severity. Complications such as disseminated intravascular coagulation (DIC), acute kidney injury (AKI), and multiple organ failure were more frequent in thrombocytopenic patients, reinforcing the critical role of platelet counts in assessing sepsis severity.

This table shows the demographic and clinical characteristics of the study participants, including age, gender distribution, comorbidities, and sepsis severity. The prevalence of thrombocytopenia is higher in ICU patients and those with severe forms of sepsis.

This table compares the mortality rates between thrombocytopenic and non-thrombocytopenic sepsis patients. A significant difference in mortality rates was observed, wit

This table shows the results of a multivariate logistic regression analysis that identifies thrombocytopenia as an independent predictor of mortality in sepsis, adjusted for age, comorbidities, and sepsis severity.

Discussion

The current study determined the prevalence of thrombocytopenia in patients with sepsis and its predictive mortality in hospitals and revealed that there was a strong correlation between the severity of thrombocytopenia and mortality in hospitals [10]. Our results are in agreement with an increasing amount of the literature that has been published in the last five years, demonstrating that thrombocytopenia is a frequent and clinically significant prognostic indicator in sepsis. Namely, thrombocytopenia was observed in 70% of the septic patients in our cohort, and the mortality rates increased with the intensity of it, especially among the patients with severe thrombocytopenia. This is in line with the current literature that shows the same rates of incidence and poor outcomes [11,12]. Several recent studies indicated the incidence of thrombocytopenia in septic populations that ranged between 20 and 40 per cent, with the accompanying heightened mortality rates [13]. Thrombocytopenia was observed in 40% of the patients in a cross-sectional ICU study, with much higher mortality rates in thrombocytopenic patients compared to non-thrombocytopenic controls ($p = 0.007$), and this observation was similar to our observation of higher death rates with low platelets. Population-level evidence investigating platelet dynamics also confirms the prognostic value of platelet dynamics; persistent low platelet dynamics were found to be related to early mortality rates, in contrast to those platelet dynamics that recovered to normal levels [14,15].Our results are further supported by meta-analytic evidence, which demonstrates that thrombocytopenic patients (with either sepsis or septic shock) have a higher odds of dying in the ICU and 28 days, and even more importantly, severe thrombocytopenia has odds of death of over 3 times (OR > 3) [16]. It is worth mentioning that this coincides with our regression analysis, which suggests severe thrombocytopenia to be an independent predictor of mortality (adjusted OR 3.5, $p = 0.001$). The overall findings of these studies add up to support the argument that thrombocytopenia is not just a laboratory finding but a significant prognostic factor in sepsis [17]. Besides mortality, thrombocytopenia has been linked to poor clinical outcomes during sepsis, including longer ICU stay, additional SOFA score, and organ dysfunction

Table 3: Complications Associated with Thrombocytopenia in Sepsis			
Complication	Thrombocytopenic (n = 68)	Non-Thrombocytopenic (n = 32)	p-value
Disseminated Intravascular Coagulation (DIC) (%)	39.70%	15.63%	< 0.05
Acute Kidney Injury (AKI) (%)	50.00%	18.75%	< 0.05
Multiple Organ Failure (%)	60.30%	25.00%	< 0.05

Table 4: Multivariate Logistic Regression Analysis for Mortality Prediction			
Predictor	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Thrombocytopenia	4.12	2.03 - 8.37	< 0.01
Age	1.05	1.02 - 1.08	0.003
Comorbidities (Diabetes, Hypertension, Kidney Disease)	1.55	1.15 - 2.09	0.004
Severe Sepsis or Septic Shock	2.87	1.52 - 5.42	< 0.01

[18]. Recent studies have indicated that high levels of lactate, high SOFA score, and other predictors are associated with the onset of thrombocytopenia in sepsis, indicating that the severity of the global disease and platelet depletion are a complex interaction [19]. Other observational records stated that the decrease in the count of platelets, especially acute or sustained decreases, was an indicator of the increased mortality and multi-organ failure; longitudinal platelet monitoring is of the essence [20].In comparison to previous studies, where platelet measurements at a single point in time were the primary outcome (or diverse definitions of thrombocytopenia were used), up-to-date studies are based on dynamic changes and more discriminating prognostic assessments [21]. As an illustration, study studies on the dynamics of platelet counts across days have revealed that recovery or trajectories of increases to normal platelet counts are associated with increased chances of survival, and elevated platelet counts are predictive of negative outcomes. This trajectory-based approach improves the accuracy of prognostics even over and above the baseline counts [22,23]. Despite the coherence of the recent results, there are still inconsistencies in the literature. Other studies have also found no significant relationships between thrombocytopenia and later mortality after the acute phase, probably because of study design, patient mix or variation in the definition of thrombocytopenia thresholds. Although we studied hospital outcomes, the longer-term survival might depend on other variables such as comorbid conditions or post-discharge care, which are not extensively covered in acute study [24,25].To conclude, modern evidence from observational studies and meta-analyses can prove the idea that thrombocytopenia is common in sepsis and is also linked with a threat to mortality [26]. Thrombocytopenia severity and temporal pattern increase the predictive value, which clarifies the significance of regular platelet screenings in sepsis [27]. Although thrombocytopenia in itself should not guide the decision to make therapy, it can be used to inform the risk hierarchy and intervene on high-risk septic patients in time. The areas that should be further study are incorporating platelet dynamics into multifactorial prognostic models and the therapeutic implications [28].

Limitations

The limitations of the study are that this study is a single-center study and, therefore, might not be applicable in other settings. Furthermore, the study is purely observational, which lacks causality between mortality and thrombocytopenia. The effects of the confounding factors, including comorbidities and variations in treatment, were not fully resolved.

Conclusion

Thrombocytopenia is a common and important prognostic variable in sepsis, and the level of thrombocytopenia is associated with high mortality. Timely detection of thrombocytopenia among patients with sepsis may lead to improved clinical decision-making and risk stratification, which will result in better patient outcomes. Study on treatment options to address thrombocytopenia as a part of sepsis treatment is still in insufficient preparation.

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