

# A Study of Mean Platelet Volume as a Prognostic Marker in Sepsis

Dr. Harish .T. J<sup>1</sup>, Dr. Balaraj K. P.<sup>2</sup>, Dr. Bharath .K<sup>3</sup>, Dr. Prabhu .P<sup>4</sup>

Posgraduate<sup>1</sup>, Professor<sup>2</sup>, Assistant professor<sup>3</sup> and Postgraduate, Dept of General Medicine, Kempegowda Institute of Medical Sciences (KIMS), Bangalore, Karnataka 560004, India

**Abstract:** **Background:** Sepsis is the most common cause of death in critically ill patients. Early goal directed therapy has been shown to decrease mortality in these patients. Sepsis is associated with thrombocytopenia and platelet indices reflect the platelet function better than the platelet count itself. Studies have proved the role of platelet indices in severe sepsis and prognosis of clinical outcome. **Aims and Objectives:** To compare platelet indices between survivors and non survivors in sepsis patients. To study if platelet indices have an impact on the prognosis of sepsis. **Method:** this is a 6 months observational study undertaken at Kims hospital, Bengaluru in the Department of medicine. A total of 50 patients who met inclusion criteria were included and was observed for the results. **Results:** A total of 50 patients were included in the study out of which 26 were males and 24 were female patients. The mean age of patients was 58.32 years. The most common cause of sepsis was Pneumonia (28%). Out of 50 patients 23 (46%) survived and 27 (54%) not survived. In non survivors MPV was 14.18 (SD 1.369) when compared with survivors 12.44 (SD 1.123). **Conclusion:** The MPV was found to be significantly elevated in sepsis patients who died when compared to sepsis patients who survived. Hence MPV can be used as prognostic marker in sepsis patients.

**Keywords:** MPV-mean platelet volume, sepsis, qSOFA

## 1. Introduction

- Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. Can be represented by an increase in the Sequential [Sepsis-related] Organ Failure Assessment (SOFA) score of 2 points or more. A close relationship between sepsis severity and thrombocytopenia has already been documented
- Mean platelet volume (MPV) is a platelet index that has been available since the 1970s. Since then, other indices of platelets have been introduced, including platelet volume distribution width (PDW), plateletcrit (PCT), and platelet large cell ratio (PLCR). An increase in MPV has been proposed as a novel prognostic indicator in infectious diseases. Studies have shown a correlation of the MPV with poor clinical outcomes of some diseases such as myocardial infarction, cerebrovascular events, diabetes, and congestive heart failure
- Platelet indices, including mean platelet volume (MPV), are readily available blood tests, although their prognostic value in patients with septic shock has not been fully explored. This study aims to explore the behavior of Mean Platelet Volume in septic shock and their clinical prognostic value.

## 2. Aims and Objectives

- To compare platelet indices between survivors and non survivors in sepsis patients.
- To study if platelet indices have an impact on the prognosis of sepsis.

## 3. Materials and Methods

- Source of data: All patients admitted to the emergency department with sepsis as per the guidelines, fulfilling

the inclusion and exclusion criteria during the period of study in KIMS Hospital Bangalore.

- Sample size: 50 patients
- Study design: Observational study
- Sampling method : Purposive sampling

### Inclusion Criteria

- All patients above 18 years of age fulfilling the quick SOFA score criteria.
- Patients with suspected infection who are likely to have a prolonged ICU stay or to die in the hospital can be promptly identified at the bedside with qSOFA score of 2 or more.
- It uses three criteria, assigning one point for each, The score ranges from 0 to 3 points.
- Low blood pressure (SBP≤100 mmHg)
- High respiratory rate (≥22 breaths per min)
- Altered mentation (Glasgow coma scale<15)

### Exclusion Criteria

1. Patients with sepsis of non-infectious aetiology like burns, pancreatitis,
2. Patients who have haematological diseases, reactive thrombocytosis, autoimmune thrombocytopenic purpura, and hypersplenism.

## 4. Methods

- Each patient presenting to KIMS HOSPITAL was evaluated at admission with detailed history and physical examination.
- The data collected includes demographic profile, comorbidities and quickSOFA score was calculated based on the parameters.
- Mean platelet volume (MPV) was measured. Venous blood samples for laboratory counts was collected from

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all patients in tubes containing ethylenediamine tetra-acetic acid (EDTA) and analyzed with Sysmex XT1800i within 30 minutes of sample collection.

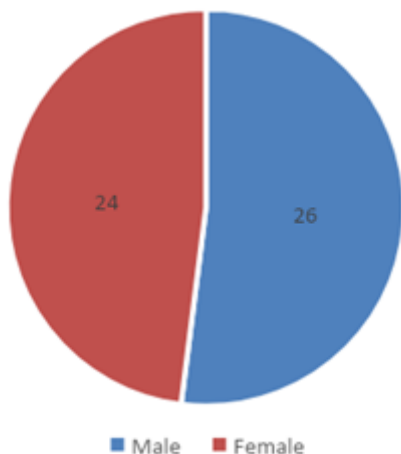
The data was compared between surviving and non-surviving patients.

### 5. Results

In our study a total of 50 patients were included, out of which 26 were males and 24 were females. Minimum age was 32 years and maximum age was 85 years. The mean age of the patient was 58.32 years. The most common cause of sepsis was pneumonia (14 cases), followed by gangrene (10cases). 26% of patients had diabetes mellitus, 12% had hypertension, 24% had both hypertension and diabetes. Out of 50 patients 23 (46%) survived and 27 (54%) not survived. In non survivors MPV was 14.18 (SD 1.369) when compared with survivors 12.44 (SD 1.123).

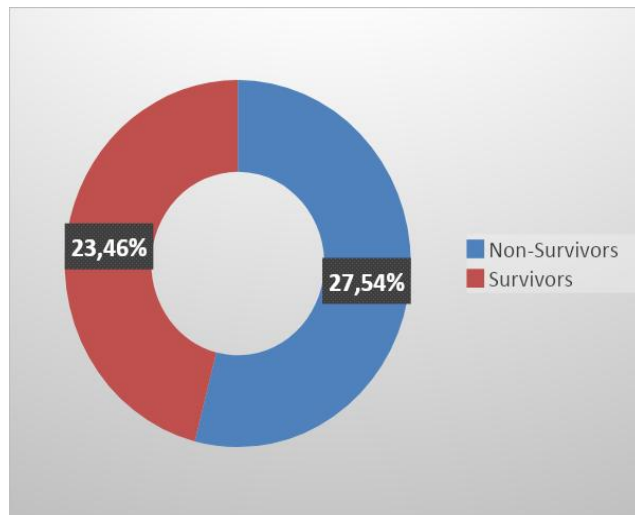
**Table 1:** Male and Female Percentage and Mean Age Group

SEX	N	Mean Age in years	Std. Deviation	Minimum	Maximum
Male	26	59.65	13.047	37	80
Female	24	56.88	16.241	32	85
Total	50	58.32	14.582	32	85



**Table 2:** Percentage Of Survivors And Non Survivors

Outcome	Frequency	Percent
Non-Survivors	27	54.0
Survivors	23	46.0
Total	50	100.0



**Table 3:** Comparison between Individual Infections

Diagnosis	Outcome		Total
	Non-Survivors	Survivors	
Pneumonia	10	4	14
Cellulitis	4	2	6
Urosepsis	4	4	8
Gangrene	4	6	10
Abdominal infection	3	2	5
Abscess	2	5	7
	27	23	50

**Table 4:** P value-for comparing MPV with survivors and non survivors

Outcome	N	Mean	Std. Deviation	Std. Error Mean	T value	independent t test P value
Non-Survivors	27	14.18	1.369	.264	4.864	<0.001
Survivors	23	12.44	1.123	.234		

### 6. Discussion

Sepsis is a major cause of morbidity and mortality. However, assessing the prognosis of sepsis remains difficult. Several parameters like procalcitonin, CRP, TLC, Lactate, qSOFA has been attempted for both diagnosis and prognosis in septic patients. Thrombocytopenia is often seen in critically ill patients, and is associated with increased mortality. The behavior of platelets and their respective MPV could be an indirect sign of disturbance in platelet production and activity, and bone marrow response in sepsis.

Our results in this study suggested that routine and concomitant measurement of MPV trend could be considered as a quick and reliable guide in the assessment of prognosis of sepsis patients.

### 7. Limitations of the Study

The sample size was limited because it was a single-center study. Outcome of the study was based on mortality, non survivors were those who expired in the hospital and survivors who got discharged alive from the hospital at that point of time. There have been concerns right from

sample collection technique, anticoagulant effect, analysis time delay; method of analyzer, calibration which may affect the results.

## 8. Conclusion

The MPV was found to be significantly elevated in sepsis patients who died when compared to sepsis patients who survived. Hence MPV can be used as prognostic marker in sepsis patients.

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