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# Thrombocytopenia in Adult Patients with Sepsis: An Observational Study in a tertiary care centre

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## I. INTRODUCTION

The definition of sepsis had been recently modified according to the third international consensus definitions-for sepsis and septic shock, it's defined as "life threatening organ dysfunction caused dysregulated host response to infection". It is commonly seen that sepsis management requires monitoring and intervention, including admission to the emergency department of the intensive care unit, if necessary. When circulatory and cellular metabolism anomalies occur, sepsis is called septic shock. These anomalies significantly increase morbidity and mortality. The many risk factors for sepsis are related to both the predisposition to develop an infection and, once infection develops, the likelihood of developing acute organ dysfunction. Common risk factors for increased risk of infection include chronic diseases (e.g., HIV infection, chronic obstructive pulmonary disease, cancers) and immunosuppression. The number of hospitalisation for sepsis continues to grow, which highlights the importance of having a clearer understanding of the pathogenesis to aid in future improvements the development of multi organ failure (MOF) increases sepsis-related mortality. MOF is partly due to endothelial dysfunction with hyper permeability and micro vascular thrombosis. Risk factors for progression from infection to organ dysfunction are less well understood but may include under lying health status, pre-existing organ function, and timeliness of treatment. Age, sex, and race/ ethnicity all influence the incidence of sepsis, which is highest at the extremes of age, higher in males than in females, and higher in blacks than in whites. The differences in risk of sepsis by race are not fully explained by socioeconomic factors or access to care, raising the possibility that other factors, such as genetic differences in susceptibility to infection or in the expression of proteins critical to the host response may play a role. Extensive micro vascular thrombosis impairs oxygen delivery to cells. This leads to tissue ischemia and cellular hypoxia leading to partial or complete inhibition of organ function. For example, hepatic arterioles occlusion leads to a decrease in hepatic function and hepatic impairment. Platelets and coagulation are both involved in thrombosis which is generally considered to be a pathological deviation of haemostasis. However, recent findings suggest that intravascular thrombosis also involves processes that are distinct from haemostasis and which occur mainly in pathological situations such as sepsis. Thrombocytopenia is a common finding in septic shock patients in the intensive care unit (ICU).Various mechanisms have been attributed to explain the occurrence of thrombocytopenia, including disseminated intravascular coagulation (DIC) [1, 2, 3.]

There is a biphasic temporal pattern in the way platelet counts changed in a large population of medical and surgical ICU patients. There is initial acute decrease followed by an increase in the platelet count. Most studies so far have explored the risk factors and clinical outcomes in critically ill medical, surgical, trauma or cardiac patients with thrombocytopenia. In this study, we looked at thrombocytopenic septic shock patients in a medical ICU. The current study aimed to study thrombocytopenia in adult patients with sepsis.

**Aim & Objectives:**

To study thrombocytopenia in adult patients with sepsis with respect to-

1. Demography
2. Risk factors & sources
3. Complications

## II. MATERIALS AND METHODS-

This was hospital based prospective observational study was performed in the patients admitted in intensive care unit of tertiary care centre from December 2022 to December 2019 for a period of one year. The subjects were evaluated as per predesigned proforma. The study was approved by the institutional ethical committee. All subjects gave informed consent before study enrolment.

**Study Design**: Prospective observational Study
**Study Settings**: Intensive Care Unit of tertiary care hospital of Department of medicine
**Study Period**: (Dec 2022-Dec 2023)
**Study Subjects**: Adult patient with sepsis admitted to ICU

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**Duration of Study**::1 year
**Sample Size**: The sample size of 60 was estimated on the basis of proportions of adult patients of sepsis admitted in medicine ICU of tertiary care hospital.
{The formula used to calculate the sample size-

**Sample Size (n)=4pq/ l$^2$**
Where,
n=minimum sample size to be calculated

p = prevalence of disease under study which was taken as 6% (Reference study **Chatterjee S, Bhattacharya M, Todi S. Epidemiology of adult-population sepsisin India: A single center 5 year experience. Indian Journal of Critical CareMedicine.2017.doi:10.4103/ijccm.ijccm_240_17**)
q=100-p=94%

l = allowable error taken 7 (can be taken 1-20)n=4 *6*94/7$^2$
=46

Taken approximately 60 considering loss to follow up}

## III. RESULTS-

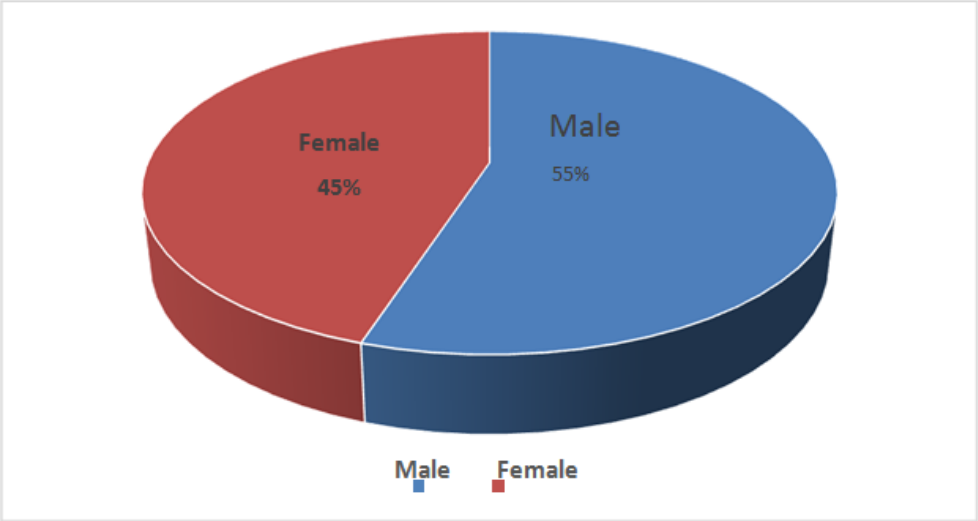


**Figure No.-01-Sex wise distribution of patients of thrombocytopenia with sepsis**

**Table No - 1. Age wise distribution of patient of thrombocytopenia with sepsis**

| Age group | Number of patients having sepsis with thrombocytopenia (%) |
|---|---|
| 14-20 | 2(3.3%) |
| 21-30 | 5(8.33%) |
| 31-40 | 5(8.33%) |
| 41-50 | 7 (11.6%) |
| **51-60** | **15(25%)** |
| 61-70 | 13(21.6%) |
| 71-80 | 11(18.3%) |
| 81-90 | 2(3.3%) |
| **Total** | **60** |

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The present study shows that Maximum number of patients of sepsis with thrombocytopenia maximum in 5th decade i.e have 15 (25%) patients, followed by 6th, 7th, 4th, 3rd, 2nd, 8th and 1st decade. Average age of patients in the study is 57.4 years. Sepsis is common in age group 50-60 yrs.

**Table No-2.Thrombocytopenia severity**

| **Thrombocytopenia(n=60)** | **No ofpatient** | **Percentage** | **Chisquarestatistics** |
|---|---|---|---|
| Mild(150000-100000) | **19** | **31.6 %** | **$X^{2=}$12.13 d f=3,p<0.01)** |
| Moderate(100000-50000) | 8 | 13.3 % | |
| Severe(50000-20000) | 24 | 40% | |
| Verysevere(<50000) | 9 | 15% | |
| Total | 60 | 100 | |

Severe type of thrombocytopenia was found significantly more **(**$p < 0.01$**)** in patients as compared to other type of grading of thrombocytopenia.

**Table No.-3 Risk factors in patient of sepsis with thrombocytopenia**

| **Risk factors** | **Thrombocytopenia present(n=60)** | **Percentage** |
|---|---|---|
| DM | 13 | (21.6%) |
| HTN | 7 | (11.6%) |
| CLD | 2 | (3.3%) |
| CKD | 4 | (6.6%) |
| CHF | 3 | (5%) |

Present study shows patient thrombocytopenic patients having DM were13 (21.6 %), Hypertension in 7 (11.6%).

**Table No -4. Source of sepsis in patients of thrombocytopenia**

| **Source of sepsis** | **Patients of thrombocytopenia(N=60)** | **Percentage** | **Chi square statistics** |
|---|---|---|---|
| Pneumonia | 37 | **61.6 %** | |
| Urinary tract infection | 15 | 25.0 % | $X^2$=48.53 df=3p<0.05 |
| Soft tissue infection | 5 | 8.33% | |
| Intra-abdominal infection | 3 | 5% | |
| Total | 60 | 100 | |

Patient of thrombocytopenia had source of sepsis as pneumonia in37 (61.6%) which was significantly high followed by urinary tract infection, 15(25%) followed by soft tissue infection5(8.22%).

**Table No-5.Complications**

| | **Complications** |
|---|---|
| Acute kidney injury | 46(76.6%) |
| Acute Liver injury | 19(31.6%) |
| ALI/ARDS | 19(31.6%) |
| Vasopressor support | 51(85%) |
| Mechanical ventilation | 32(53%) |

Present study showed 46(76.6%) patients developed acute kidney injury, 19 (31.6%) patients developed acute hepatitis, 19 (31.6%) patients developed acute lung injury or acute respiratory distress syndrome, and 51(85%) patients required vasopress or support and 32(53%) patients required mechanical ventilation.

## IV. DISCUSSION

Men had higher incidence of severe sepsis. The causes of this sex difference remain unexplained but may involve the effect of sex hormones on innate and adaptive immunity and on the cardiovascular response to cytokine signaling and the cultural belief that scarce resources of time and money should not be spent on women whom us tolerate pain and suffering.

In the present study the number of male patients was 33 (55 %) and number of female patient is 27(45%) and male to female ratio is1.20

Mehta C et al[4]study had 99 (66.4%) male and 50 (3 3 . 5 5 %) female patients and male to female ratio was 1.9 Venkata C etal[5]studyhad 85 (58.6%) male and 60 (41 %) female patients and male to female ratio was 1.41. Sepsis is more common in older patients, advancing age isa strong risk factor for the incidence of sepsis this is explained in part by the presence of comorbid conditions. .Mean age of patients in the study was 57.4 years. Williamson DR etal[6] study of thrombocytopenia in the criticallyi l lm e a na g e was 65 years comparable to our results. In Present study we had 60 patients of thrombocytopenia with sepsis, in which 7(11.6%) had hypertension, 13 (21.6 %) had diabetes. Venkata C et al[5]found 74.4% had hypertension, 37.9% had diabetes mellitus while Mehta Cetal[4] had found hypertension in 44.4%,diabetes mellitus in 18.2%.

We found source of sepsis as pneumonia in 61.6 %, urinary tract infection in 15(25 %). Venkata C et al[5] had found pneumonia in38.8%), Urinary tract infection in 18.8%.B.Sharmaetal[7]had found pneumonia in 26 (37.7%), Urinary tract infection in 23.2%. AKI (acute kidney injury) is a frequent complication of sepsis. Leukocyte infiltration in the septic kidney has been widely shown in septic patient and leukocyte depletion seems to reduce renal injury. P-select in stored in α-granules of platelets and in endothelial cells is involved in leukocyte recruitment in septic kidney. Renal hypotension and associated is chemia had been believed to be the primary lesion in Sepsis AKI, but more recently several studies have shown that although tubular cell injury and expression of markers such as KIM-1 are common, inflammation and apoptosis are also playing a role.[3] Present study had 60 patients of thrombocytopenia with sepsis in which 76.6%) patients developed acute kidney injury.

Venkata Cetal[5] found patients of thrombocytopenia with sepsis in 44.1% patients had acute kidney injury. The present study had more patient's required vasopress or support because of late presentations of patients. End tracheal intubation protects the airway, and positive-pressure breathing allows oxygen delivery to metabolically active organs in favor of inspiratory muscles of breathing and the diaphragm. During intubation, patients in shock should be closely monitored for vasodilator effects of sedating medications or compromised cardiac output due to increased intrathoracic pressure, both of which may cause hemodynamic collapse. With hemodynamic instability, noninvasive mask ventilation may be less suitable in patients experiencing sepsis- associated acute respiratory.

## V. CONCLUSION

Present study concluded that sepsis with thrombocytopenia was more prevalent in male and in older age groups. Most of thrombocytopenia was of severe type i.e platelet count between 50000-20000 occurs in sepsis. Most common source of sepsis was pneumonia followed by urinary tract infection. Thrombocytopenia in sepsis had complications like acute kidney injury, acute hepatitis, acute respiratory distress syndrome, required vasopress or support and need mechanical ventilation support. thrombocytopenia at admission or at onset of septic shock in septic shock patients can be used as an early marker for risk stratification to identify patients at risk of complicated clinical course and increased mortality. Clinicians should be aggressive in diagnosing and treating the cause of thrombocytopenia in septic shock patients in view of their poor clinical outcome.

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