

# Examine the Frequency of Thrombocytopenia in Newborns with Neonatal Sepsis

MUZAMMIL KAUSAR<sup>1</sup>, IMRANA SALAHUDDIN<sup>2</sup>, ATIA NAVEED<sup>3</sup>

<sup>1</sup>Associate Neonatologist

<sup>2</sup>Neonatologist Head of Department of Paediatrics

<sup>3</sup>Associate Pediatrician, Capital Hospital Islamabad

Correspondence to Dr .Imrana Salahuddin Email: doc.imrana28@gmail.com+923365564477

## ABSTRACT

**Aim:** To determine the frequency of thrombocytopenia in newborns admitted to NICU with neonatal sepsis.

**Study design:** Retrospective/observational study

**Place and duration:** Department of pediatrics and Neonatology, Capital Hospital Islamabad during from 1-06-2019 to 31-12-2019.

**Methods:** Total 85 neonates of both genders admitted to NICU due to neonatal sepsis were enrolled in this study. Patients detailed demographics and clinical characteristics were recorded after written consent from parents/guardians. Thrombocytopenia was defined as platelet counts <150000/ $\mu$ L. Frequency of thrombocytopenia was examined as mild, moderate, severe and very severe. Mortality associated with thrombocytopenia was examined.

**Results:** Forty eight (56.47%) were males while 37 (43.53%) were females. 60 (70.59%) patients had early onset sepsis while 25 (29.41%) had late onset sepsis. 62 (72.94%) patients had gram negative organisms while 23 (27.06%) patients had gram positive organisms. Thrombocytopenia was found in 58 (68.24%) patients, 12 (20.68%) had mild, 15 (25.86%) had moderate, 23 (39.66%) had severe and 8 (13.79%) had very severe thrombocytopenia. 21/85 (24.71%) patients died in which 18 had thrombocytopenia.

**Conclusion:** The frequency of thrombocytopenia was quite high in neonates with neonatal sepsis. Mortality rate was also high in patients with thrombocytopenia as compared to without thrombocytopenia.

**Keywords:** Neonatal Sepsis, Thrombocytopenia, Mortality

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## INTRODUCTION

Thrombocytopenia by definition is reduced platelet count < 150 x 10<sup>9</sup>/L and frequent finding in neonates during hospitalization in the Neonatal Intensive Care Unit (NICU).<sup>1</sup> Despite a large number of studies, thrombocytopenia in the newborn is still in the focus of interest, due to possible complications resulting from a reduced number of platelets, such as various bleeding, especially intracranial and necrotizing enterocolitis, with possible fatal outcome.<sup>2</sup> Thrombocytopenia is considered as a risk factor for haemorrhage, especially intraventricular in location, mortality, and adverse neurodevelopmental outcome.<sup>3</sup>

Sepsis remains an important cause of neonatal thrombocytopenia.<sup>4,5</sup> However, the reported prevalence and severity of thrombocytopenia in neonatal sepsis varies widely. Higher rates of thrombocytopenia were reported in late-onset sepsis (59.3%) compared to early-onset sepsis (24%)<sup>4</sup> as well as in the preterm and low-birth weight neonates. Thrombocytopenia of 54% in culture-proven sepsis episodes was reported among very low birth weight (VLBW) neonates.<sup>6</sup> Furthermore, Gram negative and fungal infections compared to gram positive infections had significantly higher incidence of thrombocytopenia.<sup>5</sup> In another study<sup>7</sup>, rates of thrombocytopenia in coagulase negative Staphylococcus sepsis, *Klebsiella* sepsis and isolated fungal sepsis were 33.3%, 60%, and 66%, respectively. A Spanish study reported thrombocytopenia in 100% of *Candida* sepsis.<sup>8</sup> An Indian study<sup>9</sup> reported thrombocytopenia in 59.5% of nosocomial sepsis with mild,

moderate, and severe thrombocytopenia in 27%, 20%, and 12.5%, respectively.

The duration of sepsis related thrombocytopenia varies with causative organisms. Gram negative and fungal infections had a longer duration of thrombocytopenia compared to Gram positive infections.<sup>5</sup> In addition, the mortality in fungal sepsis was higher when it was associated with thrombocytopenia than without.<sup>10,11</sup> Thrombocytopenia related to late-onset sepsis was found to be severe and associated with higher morbidity and mortality.<sup>12</sup> The present study was conducted aimed to determine the frequency of thrombocytopenia and associated mortality in neonates admitted to NICU with culture proved sepsis.

## MATERIALS AND METHODS

This retrospective/observational study was conducted at NICU of Department of pediatrics and Neonatology, Capital Hospital Islamabad during from 1-06-2019 to 31-12-2019. Total 85 patients of both genders with ages 0 to 30 days who were admitted to neonatal intensive care unit (NICU) and had culture proven neonatal sepsis were enrolled in this study. Patients detailed demographics and maternal characteristics were recorded. Types of pathogens grown on culture were recorded. Patients with thrombocytopenia due to other causes like idiopathic thrombocytopenic purpura (ITP), systemic lupus erythematosus (SLE), and neonatal alloimmune thrombocytopenia (NAIT) were excluded.

5ml blood sample was taken from all the patients and sent to laboratory for platelets examination to confirm thrombocytopenia. Thrombocytopenia was defined as platelet counts <150000/ $\mu$ L. Severity of thrombocytopenia

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was defined as mild, moderate, severe and very severe. Mild severity was platelets count 10000-150000/ $\mu$ L, moderate as 50000-<100000/ $\mu$ L, severe as 20000-<50000/ $\mu$ L and those with platelets count <20000/ $\mu$ L considered as very severe. Improvement time of thrombocytopenia was recorded. Mortality associated with thrombocytopenia was examined. All the data was analyzed by SPSS 24. Chi-square test was done to examine the association of mortality with and without thrombocytopenia with p-value <0.05 was taken as significant.

## RESULTS

Forty eight (56.47%) were males while 37 (43.53%) were females. Mean age of patients was 12.35 $\pm$ 4.68 days. 47 (55.29%) patients were preterm while 38 (44.71%) were term delivered.

Fig. 1: Frequency of thrombocytopenia among sepsis patient

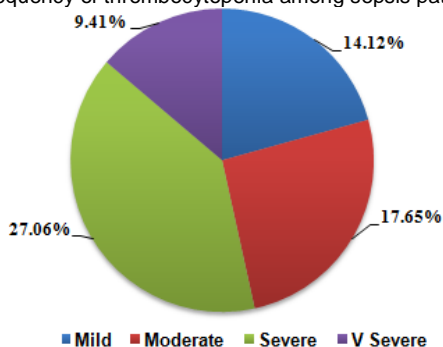


Table 1: Demographics of all the patients

Variable	No.	%
Age (days)	12.35 $\pm$ 4.68	
Gender		
Male	48	56.47
Female	37	43.53
Gestational age (weeks)		
Term>37	38	44.71
Preterm <37	47	55.29
Mode of Delivery		
C-Section	42	49.41
Normal Vaginal	43	50.59
BCP Age		
Late onset >7days	25	29.41
Early onset <7days	60	70.59
Low Birth Weight		
Yes	46	54.11
No	39	45.88

Table 2: Distribution of organisms involved for sepsis

Variables	No.	%
Gram Positive Organisms	23	27.06
Gram Negative Organisms	62	72.94

Table 3: Association of mortality with thrombocytopenia

Mortality	With Thrombocytopenia	Without Thrombocytopenia	P-value
Yes	18 (21.18)	3 (3.53)	0.001
No	40 (47.06)	24 (28.24)	
Total	58 (68.24)	27 (31.76)	

42(49.41%) patients were delivered by cesarean section while 43(50.59%) were delivered by normal vaginal. 60(70.59%) patients had early onset sepsis while 25(29.41%) had late onset sepsis. 46(54.11%) patients had low birth weight while 39(45.88%) had normal birth weight (Table 1). According to the pathogens of neonatal sepsis, 62(72.94%) patients had gram negative organisms while 23(27.06%) patients had gram positive organisms (Table 2). Thrombocytopenia was found in 58(68.24%) patients, 12(14.12%) had mild, 15(17.65%) had moderate, 23(27.06%) had severe and 8(9.41%) had very severe thrombocytopenia (Fig. 1). 21(24.71%) out of 85 patients were died, in which 18(21.18%) had thrombocytopenia while 3(3.53%) had no thrombocytopenia (Table 3)

## DISCUSSION

Neonatal sepsis is one of the most common life threatening disorder with high rate of morbidity and mortality. It is also a leading cause of admission to NICU.<sup>13</sup> Thrombocytopenia is the common clinical problem in neonates and a leading cause of morbidity and mortality among neonates whom were diagnosed to have culture proven sepsis.<sup>14</sup> This study was conducted aimed to examine the frequency of thrombocytopenia among neonates with neonatal sepsis. In this regard 85 patients admitted to NICU at our hospital and have culture proven sepsis were enrolled. 48 (56.47%) were males while 37 (43.53%) were females in our study. A study conducted by Khan et al<sup>15</sup> reported that 32 (46%) were male and 38 (54%) were female with blood culture positive sepsis.

In present study according to the maternal characteristics we found that 47 (55.29%) patients were preterm while 38 (44.71%) were term delivered. 42 (49.41%) patients were delivered by cesarean section while 43 (50.59%) were delivered by normal vaginal. Ray et al<sup>16</sup> reported that 64% neonates were preterm and 36% neonates were term and 55% patients were small for gestational age.

In our study 60 (70.59%) patients had early onset sepsis while 25 (29.41%) had late onset sepsis. 46 (54.11%) patients had low birth weight while 39 (45.88%) had normal birth weight. These results were similar to the study conducted by Guo et al<sup>17</sup> regarding incidence of thrombocytopenia in children with neonatal sepsis and they reported that 28% patients had early onset sepsis while 72% patients had late onset sepsis and 54% neonates had low birth weight <2500 g.

In present study 62 (72.94%) patients had gram negative organisms while 23 (27.06%) patients had gram positive organisms. K.pneomoniae was the commonest pathogen in 24 (38.71%) patients among gram negative organism and MRSA was the commonest pathogen among gram positive organisms. These results were comparable to many of previous studies in which K. pneumonia was the commonest pathogen in patients with neonatal sepsis 20-50% followed by acinetobacterbaumanni and methicillin resistant staphylococcal aureus.<sup>18,19</sup>

In our study thrombocytopenia was found in 58(68.24%) patients while 31.76% patients had platelets count >150000/ $\mu$ L. 12 (14.12%) had mild, 15 (17.65%) had moderate, 23 (27.06%) had severe and 8 (9.41%) had very severe thrombocytopenia. Khan reported that the incidence

of thrombocytopenia among neonatal sepsis patients was 65.7% and they reported severe thrombocytopenia in 47% patients<sup>15</sup>. Another study conducted by Ree et al<sup>20</sup> reported that the incidence of thrombocytopenia was 49.13% among sepsis patients in which 20% patients had severe thrombocytopenia.

We found that 21 (24.71%) out of 85 patients died, in which 18 (21.18%) had thrombocytopenia while 3 (3.53%) had no thrombocytopenia. A significant association was observed regarding mortality with thrombocytopenia (p-value 0.001). These results showed similarity to many of previous studies in which patients with thrombocytopenia were on high risk of mortality as compared to patients without thrombocytopenia.<sup>21,22</sup>

## CONCLUSION

Thrombocytopenia is one of the leading cause of morbidity and mortality and is directly associated with neonatal sepsis. We concluded that the frequency of thrombocytopenia was quite high in neonates with neonatal sepsis. Mortality rate was also high in patients with thrombocytopenia as compared to without thrombocytopenia.

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