

### MONITORING OF PLATELET COUNT AND THEIR INDICES IN NEONATAL SEPSIS IN RELATION TO SPECIFIC ORGANISMS

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#### Abstract

**Background:** Main cause of morbidity and mortality in neonates is neonatal septicemia. The objective is relation of platelet count and their indices in sepsis of neonates in relation to specific organisms. **Materials and Methods:** The study was carried out at M.R. M.C, KALABURAGI. 100 study subjects were taken. **Result:** Early and late onset septicaemia were 59% and 41% respectively. Gram negative organisms (57.0%) were more responsible for Septicaemia than gram positive organisms (40.0%). fungal sepsis (3%) and Thrombocytopenia were seen in 60.0% of neonates. Staphylococcus aureus was the commonest organism causing thrombocytopenia (43.3%). **Conclusion:** It was concluded that there was a correlation of thrombocytopenia, MPV, PDW with causative organism in neonatal sepsis.

#### INTRODUCTION

Definition of sepsis is “clinical syndrome characterized by presence of both infection and systemic inflammatory response syndrome”. Sepsis is usually associated with separation of an organism from either blood, cerebrospinal fluid, or urine, associated with systemic inflammatory response syndrome.<sup>[1,2]</sup> It is caused by various organisms like bacterial, viral, fungal and protozoal infections invading the blood stream were responsible for sepsis.

Sepsis characterized by positive blood culture, decrease Platelets count and increase level of C-reactive protein. Dangerous complication of septicaemia is Septic shock.<sup>[3]</sup>

Prematurity and LBW are important predisposing factors for infection in neonatal period. Such infants have a 3-to-10-fold higher incidence of infection than full term normal birth weight infants.<sup>[4]</sup>

Platelet count less than 150×10<sup>3</sup>/μl in any neonate is defined as thrombocytopenia regardless of gestation age.

Greater than 30-80% proven infection neonates associated with low level of platelet.<sup>[5,6]</sup>

Many organisms like Bacteria, virus and fungi have been associated with thrombocytopenia.<sup>[7]</sup> Low platelet count occurs in 33% of admitted infants in NICU.

In these patients thrombocytopenia presents either as early onset (<3 days) or late onset thrombocytopenia (more than >3 days).<sup>[8]</sup>

It is a well-known complication of sepsis.<sup>[9]</sup> Scheifele et al showed evidence of a connection between Gram-ve infections and thrombocytopenia.<sup>[10]</sup>

About 60% of newborns admitted to NICU with proven infection become thrombocytopenic, with platelet counts of less than 100 × 10<sup>9</sup>/L. Early onset sepsis often presents as a fulminant, multisystem illness within 72hrs of delivery and is mainly due to bacteria acquired before and during delivery. The sequence of events responsible for both early-onset and late-onset neonatal sepsis begins with colonization of the maternal genital tract.

#### MATERIALS AND METHODS

The Prospectiv study was carried out at Sangmeshwar and Basaveshwar Hospital attached to M.R. M.C, Kalaburagi. Duration of study was from December 2015 to July 2017. The protocol was passed by the board of studies and passed by ethical committee of the institution.

#### Inclusion Criteria

All neonates who have sepsis and admitted in our NICU.

## Exclusion Criteria

1. Causes of thrombocytopenia other than sepsis
2. Consent not given parents or guardians

One hundred study participants were chosen for study for Complete Blood count, platelet count and their indices like MPV, PDW, CRP and blood culture in neonates with proven sepsis admitted in our NICU.

After inoculation of 0.5 ml venous blood in a blood culture (pediatric) the growth of an organism effectively increases or 1 ml in an adult blood culture bottle.

The recommended is sodium Polyanethol Sulfonate (0.0025% to 0.003%) is an anticoagulant for the blood culture.

After blood drawing and inoculation in to the proper media, Sample was submitted for incubation immediately in microbiology laboratory.

With growing of organisms and release of CO<sub>2</sub>, CO<sub>2</sub> passes through the membrane and is mixed in water of the sensor. With free hydrogen ions generation, it cause a colour change in the sensor. It is read by the instrument.

Some other Methods are 66 Quick screening methods like quantitative direct plating (QDP), Radio-labelled carbon (14C) and automated techniques. After 3-5 days of incubation period, Blood culture reports were acknowledged.

## RESULTS

Fifty-three patients presented within 24 hours of age, 11 patients presented at the age of 2 days. The

minimum & maximum age of cases was 1 & 9 day respectively.

The Mean and SD of age of males & females were 74.51 ± 64.52 hours & 71.03 ± 53.49 hours respectively. Overall Mean age was 72.46 ± 57.23.

No difference of age was found between man & women. The sex ratio of female to male was observed to be 1:1.85

57% isolated organisms were Gram-negative, 4% gram positive 3% fungal.

Sixty patients had neonatal Thrombocytopenia. Among mentioned 60 cases, Most prevalent causative organism was staph aureus, E-coli, klebsiella Pseudomona and candida.

The Mean and SD of Platelet count of patients with gram positive, gram-negative and fungal septicaemia were 164960 ± 68083, 212870 ± 103540 and 143667 ± 18625 per µl respectively. (P<0.01 statistically significant). Total Mean and standard deviation of Platelet count was 180479 ± 93754.

Level of Platelet count in patient of isolated E-coli, staphylococcus aureus, klebsiella, candida and pseudomonas were 11000, 15000, 28000, 60000, 104000 respectively. E-coli caused severe thrombocytopenia and staphylococcus aureus and klebsiella were responsible for less severe form.

Level of MPV were 13.3 in CoNS, 10.56 in klebsiella, 10.38 in staphy aureus, 10.1 in candida, 9.82 E coli and 9.65 in pseudomonas.

Whereas PDW was 15 in CoNS, 16 in staphylococcus, 15 in klebsiella, 15 in E coli, 14.51 in candida and 14.3 in pseudomonas.

**Table 1: Distribution of Patients according to age and sex**

Age in hours	Males		Females		Total	
	No.	%	No.	%	No.	%
24 hours	33	50.7	20	57.1	53	53.0
48 hours	6	9.2	3	8.6	9	9.0
72 hours	7	10.8	4	11.4	11	11.0
96 hours	6	9.2	3	8.6	9	9.0
120 hours	5	7.7	2	5.7	7	7.0
>120 hours	8	12.4	3	8.6	11	11.0
Total	65	100.0	35	100.0	100	100.0
Mean ± SD	74.51 ± 64.52		71.03 ± 53.49		72.46 ± 57.23	
t-test value	t = 0.78		---		---	
P-value & Significance	P = 0.34 NS		---		---	

NS = Not significant

**Table 2: Platelet count (per µl) at onset of sepsis in the groups**

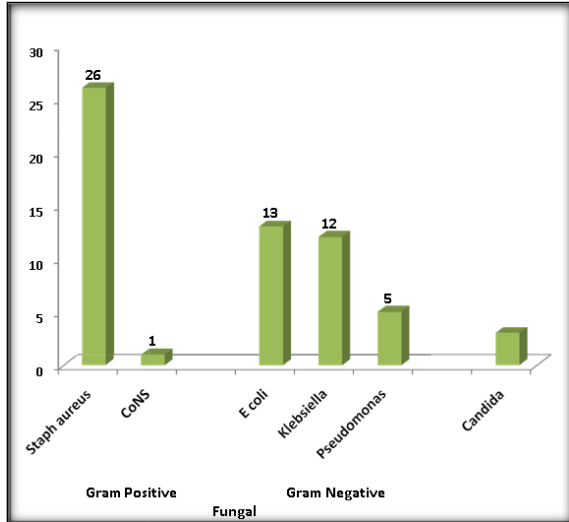
Variables	Platelet count (per µl)	Test Values	P-Value & Significance
	Mean ± SD		
Gram-Positive	164960 ± 68083	F = 3.12	P=0.043 S
Gram-Negative	212870 ± 103540		
Fungal	143667 ± 18625		
Total	180479 ± 93754		
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S = significant

**Table 3: Effect of Different Organisms on Platelet Indices in Neonatal Sepsis.**

	Organism	No. of patients	Platelet count at onset of sepsis (per µl)	Lowest platelet count (per µl)	Average MPV (fl)	MPV Range	PDW	PDW Range
Gram-	Staph aureus	26	97300	15000	10.38	9.6-13.3	15.82	14.2-

Positive 27/60(46.5%)	CoNS	1	148000	60000	13.3	13.3	16.4	17.4
Gram-Negative 30/60 (48.8%)	E coli	13	112400	11000	9.82	8.6-12.5	14.73	14.1-16.3
	Klebsiella	12	98250	28000	10.56	8.9-13.7	15.46	14.9-16.8
	Pseudomonas	5	138000	104000	9.65	9.9-11.2	14.3	14.0-15.5
Fungi 3/60(4.7%)	Candida	3	131000	60000	10.1	9.2-13.3	14.51	15.3-16.5
Total	--	60	-	-	-	-	-	-



**Figure 1: Multiple bar diagram represents distribution of Neonatal thrombocytopenia according to causative organisms.**

## DISCUSSION

Sex Incidence in our study was of male predominance. In our study Male/Female ratio is 1.8:1. Our study result is consistent with Woranart et al study which showed that males had higher incidence than female neonates.

All the six organisms which were isolated in this research were associated with low level of platelets count.

Sepsis due to gram negative (57%) was > gram +ve. In gram -ve sepsis, 24% cases was due to klebsiella pneumonia, 24% due E coli(24%) and 9% by pseudomonas, staph aureus was the main organism causing sepsis in gram +ve organism.

Parvez Rajnesh,<sup>[11]</sup> revealed that 54%-gram negative organisms were causing sepsis. Among them, Klebsiella was most common and others were by pseudomonas then acinetobacter. Out of 40% gram positive, staphylococcus was most common followed by Enterococcus. Commonest organism causing thrombocytopenia was staphylococcus (43.3%).

Evidence of high levels of early onset neonatal infection in mothers with bacterial infection or colonization. In this study group B streptococci was the common organism associated with EOS.<sup>[12]</sup> Michael cohen-wolkoweiz et al described the epidemiology of EOS in late preterm infants. Group B streptococci, E.coli, and staph aureus responsible for most EOS episodes within group of bacterial infection.<sup>[13]</sup>

Isaacs D et al (1996) in Australia, revealed that staphylococci (coagulase -ve) are the commonest cause of late onset sepsis of babies in neonatal units.<sup>[14]</sup>

In the sick, premature and neonates admitted in NICU, thrombocytopenia was common hematological condition and indicate an underlying pathology.<sup>[10]</sup>

According to Bashir Ahmad Charoo, Nosocomial sepsis-induced late onset thrombocytopenia in a tertiary care unit.<sup>[15]</sup>

In Jack D Guida's research Gram negative, grams positive and fungal were responsible as 16%,7.6%, 8% respectively.<sup>[9]</sup>

Sartaj A Bhat identified gram negative culture positive in 67.5% and gram positive is 26.3%, remaining were fungal growth. 16Klebsiella pneumonia was the commonest organism in thrombocytopenia (58%).<sup>[10,15]</sup>

Decrease numbers of platelet and related with increase in MPV (85%) was found in this research. Nelson and Kehl found that platelet consumption associated with increase in MPV in acute infection.<sup>[16,17]</sup> MPV has an main prognostic value of early stage of sepsis.<sup>[18]</sup> Jack D. Guida found that fifty four percent neonates with thrombocytopenia of which sixty one % neonates had increased MPV. 9 Neonates with MPV > 10.8fl and/or PDW > 19.1% have increased presence of bacteremia.<sup>[19]</sup>

## CONCLUSION

MPV were increased in following different organisms in the range of 1. staphylococcus aureus (9.6-13.3), 2. CONS (13.3), 3. E-coli (8.6-12.5), 4. Klebsiella (8.9-13.7), 5. pseudo omonas (9.9-11.2), 6. candida(9.2-13.3).

PDW were increased in following different organisms in the range of 1. staphylococcus aureus (14.2-17.4), 2. CONS (16.4), 3. E-coli (14.1-16.3), 4. Klebsiella (14.9-16.8), 5. Pseudomonas (14-15.5), 6. Candida (15.3-16.5).

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