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"PLATELET COUNT AND THEIR INDICES AS A MARKER OF NEONATAL SEPSIS"

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ABSTRACT:

BACKGROUND: Neonatal septicemia is a clinical syndrome characterized by signs and symptoms of infection with or without accompanying bacteremia in the first month of life. It is characterized by positive blood culture, thrombocytopenia and elevated C-reactive protein. Septic shock is the most dangerous complication of septicemia. Thrombocytopenia (platelet count < 150,000/μL) is one of the most common hematological problems in Neonatal Intensive Care Units (NICUs),. Thrombocytopenia in DIC occurs mainly due to consumption of certain coagulation factors and circulating platelets. There may be a possibility of immune mechanism & Bacteria or bacterial products leads to development of thrombocytopenia in septicemia

AIM:

- Platelet count and their indices in neonatal sepsis in relation to specific organisms.
- To identify organism involved in proven neonatal sepsis affecting platelet indices.

MATERIALS AND METHODS: A Hospital-based cross-sectional study was conducted in the Department of Paediatrics, Santhiram medical college& general hospital for 12 months.

RESULTS: A total of 50 neonates with blood culture positive for bacterial cases shows EOS(59%) was more common than LOS(41%). Out of 50 cases 57% cases had growth of gram negative organisms, 40% had growth of gram positive organisms and 3% had growth

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of fungal. Tachypnea(27%), Lethargy (20%) and refusal of feeds (8%) were the commonest clinical presentation followed by ,Fever (6%), convulsions (5%) and jaundice (5%). 60% neonates had thrombocytopenia of varying severity. Staphylococcus aureus was the most common organism associated with thrombocytopenia (43.3%%). MPV was high in 85% of cases and PDW was high in 96% of cases..

CONCLUSION: The present study highlights the association of thrombocytopenia, mean platelet volume and platelet distribution width with causative organism in proven neonatal sepsis. Staphylococcus aureus was the most common organism causing thrombocytopenia in our NICU.

KEY WORDS : sepsis screen ,neonatal septicemia,platelet distribution width,mean platelet volume.

ABBREVIATIONS :

INTRODUCTION: Sepsis is defined as clinical syndrome characterized by presence of both infection and systemic inflammatory response syndrome (SIRS). Platelet count less than 150×103 /µl in any neonate is defined as thrombocytopenia regardless of gestation age. More than 30-80%of neonates with proven infection become thrombocytopenic[1]. Bacterial, fungal and viral infections all have been associated with neonatal thrombocytopenia[2]. Thrombocytopenia (platelet count < 150,000/□L) is one of the most common haematological problems in Neonatal Intensive Care Units (NICUs), with 18- 35% of the NICU patients developing this problem before hospital discharge.

In contrast, only 2% of the neonates are thrombocytopenic at birth with Severe Thrombocytopenia (platelet count < 50,000/□L) occurring in less than 3/1000 term infants[1,]Thrombocytopenia occurs in one-third of infants admitted in neonatal intensive care unit . Bacteria or bacterial products may cause endothelial damage leading to platelet adhesion and aggregation or may bind directly to platelets leading to aggregation and accelerated clearance from circulation. There may be a possibility of immune mechanism for development of thrombocytopenia in septicemia as there is presence of circulating immune complex in septicemia patients and reduced number

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of complement complex in patients with septicemic shock[3]. All neonates are underwent investigations are complete hemogram,CRP,sepsis screen, peripheral smear, platelet distribution width,mean platelet volume etc.

AIMS AND OBJECTIVES:

- Platelet count and their indices in neonatal sepsis in relation to specific organisms.
- To identify organism involved in proven neonatal sepsis affecting platelet indices.

MATERIALS AND METHODS:

A Hospital-based cross-sectional study was conducted in the Department of pediatrics Santhiram Medical College, and General Hospital for 12 months after approval from the Hospital Ethics and Research Committee. Investigations sent for all these neonates included blood culture, sepsis screen (CRP, micro ESR, TLC, ANC, IT ratio) and platelet indices (Platelet count, MPV, PDW) who were included in the study.

DURATION OF STUDY: From May 2022 to May 2023

SAMPLE SIZE: 50

METHODS OF DATA COLLECTION:

Neonates who were born in santhiram medical college & general hospital & outside born babies who were referred to santhiram hospital were included in included in the study with proven sepsis.

SAMPLING TECHNIQUE: Simple Random Sampling

INCLUSION CRITERIA :

1.All neonates admitted in our NICU with proven sepsis.

2.neonates whose parents have given assent for study

EXCLUSION CRITERIA:

1. Causes of thrombocytopenia other than sepsis
2. Neonates whose parents or guardians haven't given assent for study.

DATA ANALYSIS:

1. Data was collected using a pretested proforma meeting the study's objectives. Detailed history, physical examination, and necessary investigations were undertaken.

RESULTS:

Table 1: - Age distribution in the case group

Age in hours	Male	Female	Total %
24 hours	16	10	52%
48 hours	3	2	10%
72 hours	4	2	12%
96 hours	2	1	6%

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120 hours	3	1	8%
>120 hours	4	1	8%
Total	**34**	**17**	**100.0**

The study reveals that, most patients 26 (52.0%) presented within 24 hours of age[4], followed by 6 (12.0%) patients who presented after 48 hours of age.

The minimum age of a patient was 1 day (24 hours) and maximum age of a patient was 9 days .

There was no statistically significant difference of age of patients among males and females

The sex ratio of male to female in the study was observed to be 2:1

Figure-1: Multiple Bar Diagram Representing Distribution of patients according to age % sex

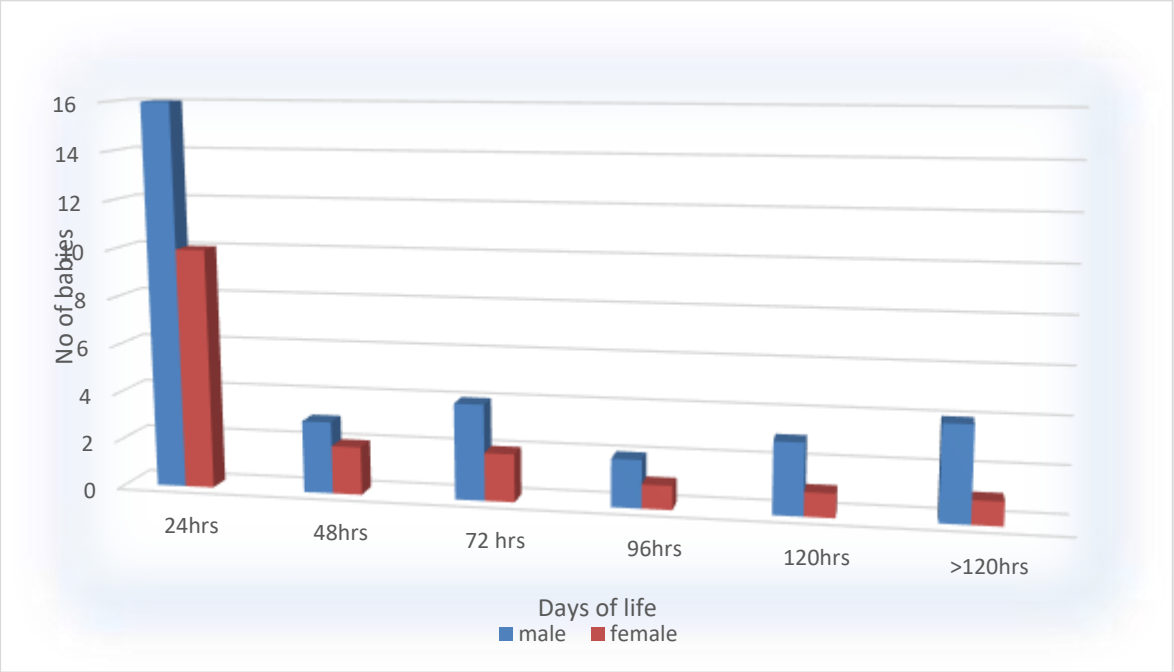

Table 2 : Distribution of Neonatal Sepsis based on age of onset

Sepsis	**No. of patients**	**%**
EOS	**30**	**60%**

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LOS	**20**	**40%**
Total	**50**	**100.0**

In the study EOS were 30(60%) and LOS been 20 (40.0%) patients. EOS more common than LOS

Table 2: causative organisms of sepsis

The study reveals that, most of the organisms isolated were **Gram-negative** (56%), followed by **gram positive(40%)** and **fungal(4%)**.

Table 4 : Degree of Neonatal Thrombocytopenia

Variable	Organisms	No. of patients	%
Gram-Positive (40.0%)	Staph aureus	17	34
	CoNS	2	4
	Enterococci	1	2
Gram-Negative(57.0%)	E coli	12	24
	Klebsiella	12	24
	Pseudomonas	4	8
Fungal (3.0%)	Candida	2	4
Total	--	50	100.0

Sepsis	Thrombocytopenia			Total
	Mild (1,00,000-1.5L)	Moderate (50,000-1,00,000)	Severe (< 50,000)	

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Present	**22 (73.3%)**	**6 (20%)**	**2 (6.7%)**	**30**

The study reveals that, Maximum number of patients 22 (73.3%) had mild Thrombocytopenia, followed by 6 (20%) patients had moderate Thrombocytopenia and 2 (6.7%) patients had severe Thrombocytopenia.

Table No.5: Comparison of sepsis and Platelet Distribution width

Sepsis	**Platelet Distribution width (PDW)**			**Total**
	Decreased ≤ 7.5	**Normal 7.5-11.5**	**Increased > 11.5**	
Present	**0 (0.0%)**	**2 (4.0%)**	**48 (96.0%)**	**50 (100.0%)**

The study reveals that, Maximum number of patients - 48(96.0%) patients had increased Platelet Distribution width (PDW).

Table No.6: Comparison of sepsis and Mean Platelet volume (MPV

Sepsis	**Mean Platelet volume (MPV)**		**Total**
	Increased	**Decreased/Normal**	
Present	**42 (84%)**	**4 (16%)**	**50 (100.0%)**

The study reveals that, Maximum numbers of patients 42(85.0%) patients had Increased MPV.

Table No.07: 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		

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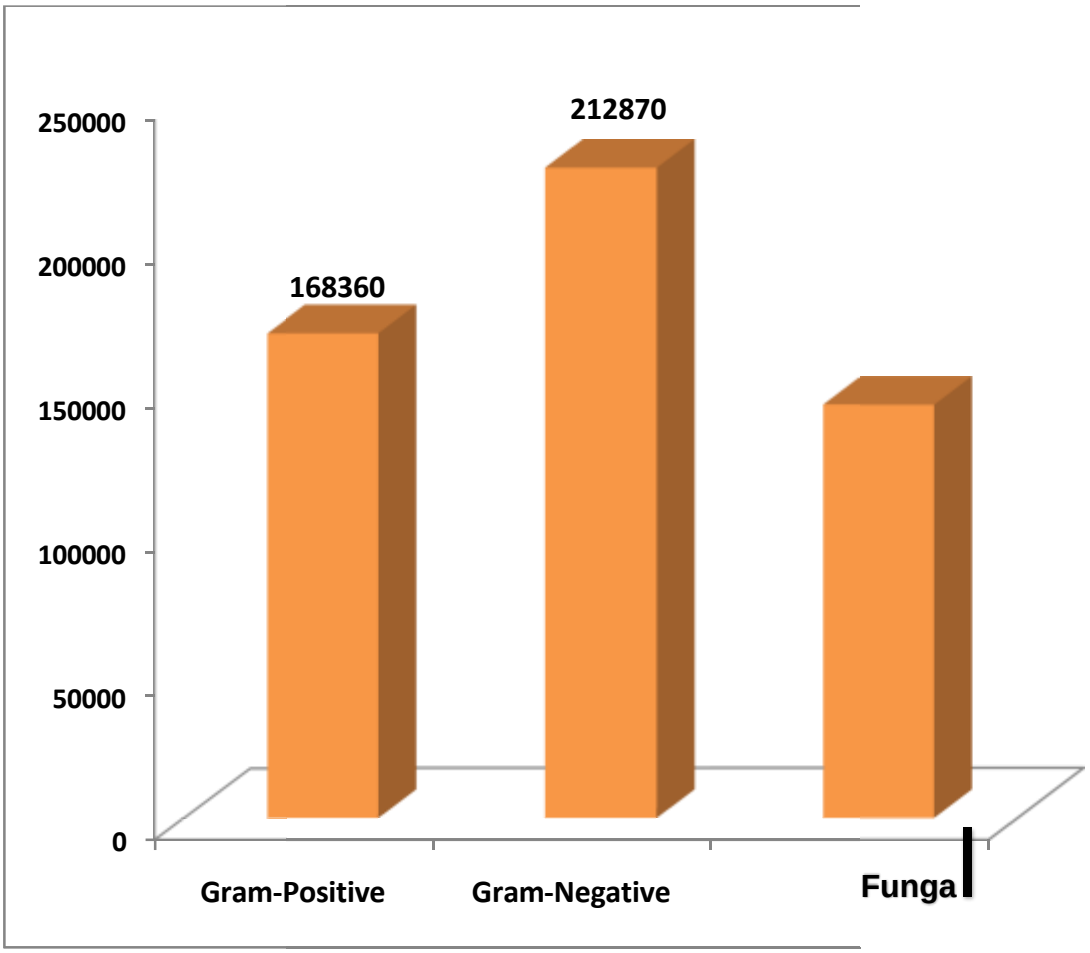
Gram-Negative	212870 ± 103540	F = 3.12	P=0.043 S
Fungal	143667 ± 18625		
Total	180479 ± 93754	---	---

There was statistically significant difference of Platelet count (per µl) among gram-positive and negative and Fungi patients (P<0.01)

Figure 2 : Multiple bar Diagram Represents Platelet count (per µl) at onset of **sepsis in the groups**



DISCUSSION

More than 30-80%of neonates with proven infection become thrombocytopenic.Bacterial, fungal and viral infections all have been associated

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with neonatal thrombocytopenia.[18]

Thrombocytopenia occurs in one-third of infants admitted in neonatal intensive care unit. Thrombocytopenia is frequently associated with mucosal bleeds and purpura. Fungal sepsis is associated with greater degree of thrombocytopenia than is seen with gram positive or gram negative organisms and outcome in these neonates is poor[7].

MPV levels may increase in mild inflammation because of the raise of large platelets, or on the contrary, MPV levels may decrease in severe inflammation owing to the depletion of large platelets in inflammatory area[8] Destructive thrombocytopenia known to be associated with high MPV levels while low level of MPV is reported in hypo-proliferative thrombocytopenia[9].

These observations indicate that MPV may be a negative acute phase reactant as well as a positive acute phase reactant and may show fluctuation in different phases of sepsis.

CONCLUSION

Neonatal sepsis has vague signs and symptoms, so high index of suspicion helps in arriving at early diagnosis and management of sepsis.

Neonatal sepsis was common in males.

Gram positive organisms were the predominant causative agents of septicemia 40% as compared to gram negative organisms 56% and fungal sepsis 4%.

Staphylococcus aureus was the commonest organism responsible for thrombocytopenia.

Among all neonates with sepsis 43% had mild thrombocytopenia, 13% had moderate thrombocytopenia and 4% had mild thrombocytopenia.

Thrombocytopenia of varying severity was seen in 60.0% of neonates. Mean

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platelet volume was high in 84% of cases and Platelet distribution width was high in 96% of cases.

REFERENCES

1. Forsteier F, Daffos F, Galactéros F, Bardakjian J, Rainaut M, Beuzard Yet al; Haematological values of 163 normal foetuses between 18- 30 weeks of gestation. *Pediatr Res*. 1986; 20(4):342-

   Laura A Stokowski. Neonatal thrombocytopenia evaluation and management National association of neonatal nurses- 22 annual conference 46.
2. Christensen RD, Henrey E, Weidmeier SE et al. Thrombocytopenia and neutropenia among ELBW neonates *Hematological Report*. 2006; 2 (10): 126-132.
3. Sankar MJ, Agarwal R, Deorari AK and Paul VK. Sepsis in the Newborn. Indian Journal of Pediatrics. 2008 75(3):261.
4. SharmilaGhosh, Meenu Mittal, GeethaJaganathan. Early diagnosis of neonatal sepsis using a hematological scoring system. Indian J Med Sci 2001;55:495-500.
5. Modanlou HD Oritz OB. Thrombocytopenia in neonatal infection. Clinpeditr (phila) 1981; 20:402-407
5. Jack D. Guida, Annette, M Kunig Kathleen H. Leef RN. Steven E, Mc
6. Kenzie, avid A Paul. Platelet count and sepsis in very low birth weight neonates: is there an organism specific response. Pediatricss 2013; 111 (6) 1411-1415.
7. Nelson RB 3rd, Kehl D. Electronically determined platelet indices in thrombocytopenic patients. *Cancer*. 1981 Aug 15;48 (4):954–6.
8. Charoo BA, Iqbal JI, Iqbal Q, Mushtaq S, Bhat AW, Nawaz I. Nosocomial

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sepsis-induced late onset thrombocytopenia in a neonatal tertiary care unit: a prospective study. Hematol Oncol Stem Cell Ther. 2009; 2(2):349-353.