ORIGINAL RESEARCH PAPER
Volume - 11 | Issue - 04 | April - 2022 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

DEGREE OF THROMBOCYTOPENIA AND VARIATION IN PLATELET INDICES IN NEONATAL SEPSIS

Pathology

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ABSTRACT

Aim And Objectives: The present study was done to asses the degree of thrombocytopenia and variation in platelet indices in neonatal sepsis.
Materials And Method: The present study was done to asses the degree of thrombocytopenia and variation in platelet indices in neonatal sepsis. The Platelet indices recorded were Mean Platelet Volume (MPV), Platelet Distribution Width (PDW) and platelet count. The values of platelet count, MPV and PDW were studied in relation to sepsis in both categories.
Results: Decreased activity was significantly more among subjects with moderate and severe thrombocytopenia. Shock, Apnea, Respiratory distress and Bleeding manifestations was significantly more among Neonate with culture proven sepsis. The mean Platelet Count was significantly more among neonates with culture negative sepsis as compared to neonates with culture positive sepsis. Severe thrombocytopenia was found to be significantly more among culture positive cases. Increased Platelet Distribution Width was found to be significantly more among culture positive cases.
Conclusion: We concluded that there was severe degree of thrombocytopenia in proven neonatal sepsis cases. Neonates with culture-proven sepsis have a high prevalence of thrombocytopenia, high MPV, and high PDW, so these can be used as early diagnostic biomarkers of neonatal sepsis and it may be combined with existing sepsis screen to specifically exclude non-septic cases.

KEYWORDS

Thrombocytopenia, Platelet indices, Neonatal sepsis

INTRODUCTION

- In neonatal intensive care units (NICUs), Neonatal Thrombocytopenia (platelet count less than 150 $\times 10^9$ /L), is the frequently encountered hematologic findings.[1]
- Maternity complications such as intra-uterine growth restriction, HELLP syndrome (Hemolysis, elevated liver enzymes, and low platelet count), mother's diabetes status or use of medicines are commonly linked to early onset thrombocytopenia.[2]
- Sepsis and necrotizing enterocolitis (more than 80% cases) are the causes of late onset Neonatal Thrombocytopenia (NT). Late onset thrombocytopenia is more often severe than early onset disease and bleeding is found to be more frequent.[2]
- Sepsis should not be regarded as a homogenous entity, as it neglects the pathogenic and clinical differences between the various causative micro-organisms and clinical syndromes and presentations of neonatal sepsis.[3]

MATERIALS AND METHOD

This cohort study was carried out among all neonates with proven sepsis admitted to the neonatal intensive care unit (NICU).

Ethical Clearance

The permission to carry out the study was obtained from the Board of Studies and Institutional Ethical Committee. Written informed consent was obtained from each patient or their attender before undergoing the procedure.

Inclusion Criteria-

Neonatal age group presenting with sign and symptoms of sepsis

Exclusion Criteria-

Neonates presenting with congenital and acquired causes of thrombocytopenia other than sepsis were excluded

Study Procedure

On the basis of reports of the blood culture and sepsis screen, the neonates were classified into culture positive sepsis and no sepsis on the basis of definitions. The proven Sepsis (Septicaemia) was characterised by positive blood culture with clinical and/or laboratory evidence of sepsis.

Neonates that were transferred within the first 24 hours after the clinical sepsis onset were also excluded, as well as neonates with other causes of neonatal thrombocytopenia such as fetal/neonatal alloimmune thrombocytopenia (FNAITP) or maternal immune thrombocytopenic purpura (ITP), exchange transfusion and cases of suspected contamination of blood culture (defined as no rise in CRP >10mg/L during sepsis episode and withdrawal of antibiotic treatment within 72 hours). In case of platelet aggregation in the EDTA tubes, the aggregated platelet count is usually shortly followed by a new count after notification by our lab.

Sample Size:

The study population has been calculated by using the formula given below:

$$n = \frac{Z^2 \alpha/_2 \, P(100-P)}{E^2}$$

$Z^2\alpha/_2$: Standard Normal Variate
P: Prevalence rate
E: Error
In present Study:
$Z^2\alpha/_2 = 1.96$ at 5% type 1 error
$P = 58.7\%$ $E = 10\%$ $n = \frac{(1.96)^2 \times 58.7(100-58.7)}{(10)^2 100} = \frac{9313.23}{100} = 93.13$
≈ 93 (Minimum Sample Size)

As per sample size calculation, a figure of 93 was arrived at to be the minimum sample size.

However, given the nature of the study, the sample size was taken to be 100 cases.

Data Collection

This study assessed the occurrence of thrombocytopenia in subjects with neonatal sepsis. The severity and duration of thrombocytopenia was also assessed, along with severe hemorrhage and mortality. Thrombocytopenia was defined as platelet counts of less than 150×10^9 per litre (moderate and severe thrombocytopenia were defined as less than 100×10^9 and fewer than 50×10^9 per litre respectively).

The Platelet indices recorded were Mean Platelet Volume (MPV), Platelet Distribution Width (PDW) and platelet count. The values of platelet count, MPV and PDW were studied in relation to sepsis in both categories.

Statistical Analysis

The data was entered into the Microsoft excel and the statistical analysis was performed by statistical software SPSS version 21.0. The Quantitative (Numerical variables) were present in the form of mean and SD and the Qualitative (Categorical variables) were present in the form of frequency and percentage.

The chi-square test was applied for comparing the categorical variables such as gender, adverse events between the 2 groups. The

sensitivity, specificity, positive and negative predictive values and accuracy were calculated. The p-value was considered to be significant when less than 0.05.

RESULTS

Table 1: Clinical Presentations Of Neonates Associated With Neonatal Thrombocytopenia

	Culture for Sepsis		χ^2 value	p-value
	Negative	Positive		
Fever	2	3	4.128	0.248
	9.1%	16.7%		
Hypothermia	3	5	1.534	0.674
	13.6%	27.8%		
Feeding difficulties	5	10	6.811	0.078
	22.7%	55.6%		
Decreased activity/ Not feeding well	9	10	11.742	0.008*
	40.9%	55.6%		
Shock	2	10	36.175	0.001*
	9.1%	55.6%		
Convulsions	2	1	5.064	0.167
	9.1%	5.6%		
Abdominal distention	0	1	2.182	0.536
	0.0%	5.6%		
Apnea	1	5	12.239	0.007*
	4.5%	27.8%		
Respiratory distress	12	15	5.027	0.035*
	54.5%	83.3%		
Bleeding Manifestation	0	3	12.064	0.007*
	0.0%	16.7%		

- Decreased activity was significantly more among subjects with moderate and severe thrombocytopenia. Shock, Apnea, Respiratory distress and Bleeding manifestations was significantly more among Neonate with culture proven sepsis.
- The mean Platelet Count was significantly more among neonates with culture negative sepsis (3.08±0.58) as compared to neonates with culture positive sepsis (0.83±0.16).

Table 2:Association Of Neonatal Sepsis With Degree Of Thrombocytopenia

		Culture for Sepsis				
		Negative		Positive		
Severity of thrombocytopenia	Mild	34	79.1%	9	20.9%	χ^2 value = 26.383, pvalue = 0.001*
	Moderate	13	48.1%	14	51.9%	
	Severe	7	23.3%	23	76.7%	
Platelet Distribution Width	Normal	29	53.7%	7	15.2%	χ^2 value = 24.135, pvalue = 0.001*
	Decreased	17	31.5%	12	26.1%	
	Increased	8	14.8%	27	58.7%	
Mean Platelet Volume	Normal	27	50.0%	8	17.4%	χ^2 value = 24.135, pvalue = 0.001*
	Decreased	20	37.0%	13	28.3%	
	Increased	7	13.0%	25	54.3%	

- Severe thrombocytopenia was found to be significantly more among culture positive cases.
- Increased Platelet Distribution and Mean Platelet Volume was found to be significantly more among culture positive cases compared to culture negative cases.

DISCUSSION

- *Karne et al.*[4] stated that of total sepsis positive cases, severe thrombocytopenia was presented in 57.5%, while mild and moderate thrombocytopenia in 22.5% and 20.0% respectively.
- Guclu et al.[5] showed that there was a significant difference between MPV and PDW of sepsis cases and control group, and patients with PDW higher than 18% had higher risk of death.

CONCLUSION

- We concluded that there was severe degree of thrombocytopenia in proven neonatal sepsis cases.
- Neonates with culture-proven sepsis have a high prevalence of thrombocytopenia, high MPV, and high PDW, so these can be used as early diagnostic biomarkers of neonatal sepsis and it may be combined with existing sepsis screen to specifically exclude non septic case.

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