

A STUDY ON PLATELET COUNT AND PLATELET INDICES IN NEONATAL SEPSIS IN A TERTIARY CARE CENTER

Dr Neha Sharma¹, Dr G S Senger¹, Dr Seema Meena¹, Dr Priyanka Sharma¹

¹Department of Pediatrics, S.P. Medical College, Bikaner

Article Info: Received 20 July 2021; Accepted 29 August 2021

DOI: <https://doi.org/10.32553/ijmbs.v5i9.2187>

Corresponding author: Dr. Neha Sharma

Conflict of interest: No conflict of interest.

Abstract

Background: The present study is undertaken to evaluate Platelet count and platelet indices in diagnosis of neonatal sepsis.

Methods: This prospective observational study was conducted on 100 consecutive neonates (both inborn and out born), with clinical signs and symptoms of sepsis along with either positive culture (confirmed neonatal sepsis) or other laboratory findings suggestive of bacterial and fungal infection in absence of positive cultures (probable sepsis), were included after written informed consent from parents.

Results: 71 (71.00%) out of 100 cases had increased values of Platelet Distribution Width. In Proven sepsis group 31(86.11%) cases had increased values of PDW, in Probable sepsis 31(63.27%) and in No sepsis group 9(60.00%) cases were having increased values of PDW. This difference was statistically not significant (P value is 0.08).

Conclusion: Platelet count and platelet indices, which are easily available hematological parameters in remote & resource poor areas of our country, should be taken into consideration for suspected cases of neonatal sepsis so that prompt treatment can be given, and morbidity and mortality can be reduced.

Keywords: Sepsis, TPC, MPV, PDW.

Introduction

Sepsis in newborn continues to be serious problem leading to significant amount of morbidity and mortality¹. The inability of neonates to completely suppress the minimum inflammatory response makes them more susceptible to bacterial invasion of the blood stream than older adults and the risks are even higher in preterm infants².

Quantification of acute phase proteins, cytokines, and cell surface antigens and bacterial genomes have been used, either alone or in combination, for early diagnosis of neonatal sepsis. Some of these markers are sensitive and specific but sophisticated or expensive so impractical for developing countries like ours³.

This life-threatening condition is treatable if diagnosed early but unfortunately, the early signs and symptoms are often non-reliable and confusing which makes it difficult to establish an early clinical diagnosis.

Thrombocytopenia is used as an early but non-specific marker of sepsis in neonates. Platelet size can be analyzed using Mean Platelet Volume and Platelet Distribution Width, and it correlates with platelet activity. High MPV indicates an increased quantity of young platelets in the circulation³. In neonatal period, MPV ranges from 10-12fl⁴. There are high MPV levels in destructive thrombocytopenia and low MPV levels in hypo-proliferative thrombocytopenia. Platelet distribution width (PDW) is an indicator of variation in platelet size. Normal values of PDW are between 10 % and 17.9 %⁵.

Changes in Platelet parameters like Mean Platelet Volume and Platelet Distribution Width are helpful in diagnosis of neonatal sepsis but these indices have not been extensively studied in neonatal sepsis. Hence the present study is undertaken to evaluate platelet count and platelet indices in diagnosis of neonatal sepsis.

Materials and Methods

This prospective observational study was conducted on 100 consecutive neonates (both inborn and out born) with clinical signs and symptoms of sepsis along with either positive culture (confirmed neonatal sepsis) or other laboratory findings suggestive of bacterial and fungal infection without positive culture (probable sepsis) were included after taking written informed consent from parents.

Inclusion criteria:

1. All neonates (<28 days) with symptoms and signs of sepsis like poor feeding, lethargy, tachypnea, hypothermia, convulsion etc. along with either positive culture or other laboratory findings (C-reactive protein and CSF culture positive) suggestive of bacterial or fungal infection without positive culture.
2. Neonates of mother with predisposing factors were included in the study.

Exclusion criteria:

1. Neonates with congenital anomalies, Hypoxic ischemic encephalopathy, Hyaline membrane disease, congenital heart disease.
2. All newborns with neonatal hyperbilirubinemia due to causes other than sepsis like physiological jaundice, Rh, ABO incompatibility, TTN, MAS without clinical or laboratory suspicion of sepsis.
3. Congenital and acquired causes of thrombocytopenia other than sepsis.
4. Babies without parental consent.
5. PIH and pre-eclampsia in mother.
6. Familial causes of thrombocytopenia (Storage disorders).

Statistical Analysis

The quantitative parameters such as age, platelet indices, mean and median were computed, and standard deviation was estimated as a measure of variation. The platelet count was grouped into mild, moderate and severe degree. Frequencies were expressed in percentages. The differences in quantitative variables between groups were assessed by means of the unpaired t test. ANOVA was used to assess the quantitative variables. The chi square test was used to assess the differences in categorical variables between groups. A p value of <0.05 using a two-tailed test was taken as being of significance for all statistical tests. All data were analyzed with a statistical software package. (SPSS, version 21.0 for windows)

Results**Table 1: General feature of study subjects**

Age (days)	3.2±0.96 days
Male : female	62 : 38
Birth weight	2.61±0.32 Kg

Table 2: Sepsis in relation to platelet count of study subjects

Platelet count	Proven sepsis		Probable sepsis		No sepsis	
	N	%	N	%	N	%
Normal	4	11.11	9	18.37	4	26.67
Mild thrombocytopenia	9	25.00	21	42.86	5	33.33
Moderate thrombocytopenia	11	30.55	9	18.37	3	20.00
Severe thrombocytopenia	12	33.33	10	20.41	3	20.00
Total	36	100	49	100	15	100

P = 0.126 (NS)

Table 2 shows that out of 100 cases 83(83.00%) had thrombocytopenia, out of which 35(35.00%) had mild degree of thrombocytopenia, 23(23.00%) had moderate degree of thrombocytopenia and 25(25.00%) neonates had severe degree of thrombocytopenia.

Table 3: Sepsis in relation to MPV (fl)

MPV (fl)	Proven sepsis		Probable sepsis		No sepsis	
	N	%	N	%	N	%
≤10.8	3	8.33	9	18.37	7	46.67
> 10.8	33	91.67	40	81.63	8	53.33
Total	36	100	49	100	15	100

P = 0.01 (S)

Table 3 shows that 81(81.00%) out of 100 cases had increased values of Mean Platelet Volume. In sepsis proven group 33 (91.67%) cases had increased values of MPV. In probable sepsis 40(81.63%) and in no sepsis group 8(53.33%) cases had increased values of MPV. This difference was statistically significant (P value is 0.01).

Table 4: Sepsis in relation to PDW (fl)

PDW (fl)	Proven sepsis		Probable sepsis		No sepsis	
	N	%	N	%	N	%
≤19.1	5	13.89	18	36.73	6	40.00
> 19.1	31	86.11	31	63.27	9	60.00
Total	36	100	49	100	15	100

P = 0.08 (NS)

Table 4 shows that 71 (71.00%) out of 100 cases had increased values of Platelet Distribution Width. In Proven sepsis group 31(86.11%) cases had increased values of PDW, in Probable sepsis 31(63.27%) and in No sepsis group 9(60.00%) cases were having increased values of PDW. This difference was statistically not significant (P value is 0.08).

Discussion

Sepsis is the commonest cause of neonatal mortality and is probably responsible for 30 to 50% of total neonatal deaths each year in developing countries. One of the most difficult tasks faced by the neonatologist is to clinically differentiate between septicemic and non septicemic cases. This is because several conditions like birth asphyxia, hypoglycemia, hypothermia, prematurity and intracranial haemorrhage have clinical features similar to septicemia.

The gold standard for diagnosis of neonatal sepsis is a positive blood culture which requires a minimum period of 48-72 hours and yields positive results in 25-70% of cases.⁶

In our study 81(81.00%) out of 100 cases had increased values of Mean Platelet Volume. In sepsis proven group 33 (91.67%) cases had increased values of MPV. In probable sepsis 40(81.63%) and in no sepsis group 8(53.33%) cases had increased values of MPV. This difference was statistically significant (P value is 0.01). 71 (71.00%) out of 100 cases had increased values of Platelet Distribution Width. In Proven sepsis group 31(86.11%) cases had increased values of PDW, in Probable sepsis 31(63.27%) and in No sepsis group 9(60.00%) cases were having increased values of PDW. This difference was statistically not significant (P value is 0.08). It was in concordance with the study by Ishwar *et al*⁷ in which 84.6% cases of Sepsis proven and 59% cases of No sepsis group had increased values of MPV. Similar results were found in study by Ishwar *et al*⁷ where increased values of PDW were found in 79% cases of Sepsis proven group and 63% cases of non-sepsis group.

Conclusion

We concluded that platelet count and platelet indices, which are easily available hematological parameters in remote & resource poor areas of our country,

should be taken into consideration for suspected cases of neonatal sepsis so that prompt treatment can be given accordingly, and morbidity and mortality can be significantly reduced.

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