https://doi.org/10.29309/TPMJ/2022.29.12.7173

The Professional Medical Journal
www.theprofesional.com
2022, Volume, 29 Issue, 12

ORIGINAL ARTICLE

Frequency of thrombocytopenia in neonatal sepsis.

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Article Citation: Malik H, Malik M, Ashraf S. Frequency of thrombocytopenia in neonatal sepsis. Professional Med J 2022; 29(12):1846-1851. https://doi.org/10.29309/TPMJ/2022.29.12.7173

ABSTRACT… Objective: To determine the frequency of thrombocytopenia in neonatal sepsis. **Study Design:** Descriptive Cross Sectional study. **Setting:** King Edward Medical University, Mayo Hospital Lahore. **Period:** November 2020 to April 2021. **Material & Methods:** The study was conducted over a period of six months. Neonates with clinical diagnosis of sepsis admitted in Neonatal intensive care unit, who fulfilled the inclusion criteria were enrolled in the study. Platelet count was measured on automated hematology analyser (SYSMEX,XN-1000) and verified on peripheral smear examination. The variables under study were subjected to SPSS 26. Chi Square test was used as a test of significance. P value <0.05 was considered significant. **Results:** Among 90 neonates with sepsis, Thrombocytopenia was present in 75% cases. P value <0.05%. **Conclusion:** Frequency of thrombocytopenia was statistically high in neonatal sepsis. Platelet count is a sensitive indicator of neonatal sepsis.

Key words: Chi-Square Test, Neonatal Sepsis, Thrombocytopenia.

INTRODUCTION

Neonatal sepsis refers to an infection in the bloodstream in newborns less than 4 weeks old. It is a major cause of morbidity and mortality in septic neonates especially in underdeveloped countries.[1] Neonatal sepsis is classified into early-onset sepsis (EOS) and late-onset sepsis (LOS). EOS is defined as sepsis before 3 days of life whereas sepsis in neonates after 3 days of life is known as LOS.

Diagnosis of neonate sepsis is usually made on clinical findings (i.e. poor feeding, fever, respiratory distress). Although, blood culture considered as gold standard for the diagnosis of sepsis, is found to be positive in only 20% of cases. Antibiotic use during pregnancy and insufficient volume of withdrawn blood leads to high rate of false negative culture results. Moreover, due to delay in reporting of about 24-72hrs, the early treatment decisions cannot be made solely on the basis of blood culture. Due to these limitations, neonatologists usually prefer a sepsis screen which has variable sensitivity in different studies conducted so far.[2-3]

White blood cell count (WBC) along with absolute neutrophil count (ANC), and immature to total neutrophil (I/T) ratio that were used previously have poor sensitivity and need serial followup tests. Age-specific nomograms of WBC, ANC, and I/T ratio should be used as they can predict sepsis in a better way.[4]

So we need lab tests that are sensitive and have short turn around time in guiding the management of septic patients. This will prevent the adverse effects of antibiotics on unaffected neonates due to empirical use of antibiotics.[5,6]

The haematological scoring system (HSS) shows that sepsis is most likely the diagnosis when HSS score is ≥3.[7] Although it has a high sensitivity of 96%, but the positive predictive value is only 31%. Thrombocytopenia is seen frequently in sepsis. According to recent studies conducted

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Article received on: 16/06/2022
Accepted for publication: 17/08/2022

internationally, 57% of septic neonates showed severe degree of thrombocytopenia, Jack D.Guida reported 54% of septic neonates had thrombocytopenia, which can be used as an important diagnostic indicator of neonatal sepsis.[8] High mortality rate was observed in bacterial sepsis associated with thrombocytopenia.

This study is aimed at finding out the correlation between neonatal sepsis and thrombocytopenia in our population which will help the neonatologists to use these markers as a screening tool along with the existing sepsis screen for early diagnosis of neonatal sepsis as it is an easy and cost effective method. It will also stress the need for continuous monitoring of platelet count as thrombocytopenia has been reported as an independent risk factor for sepsis related death.[9,10]

MATERIAL & METHODS

A prospective Descriptive cross sectional study was conducted in from November 2020 to April 2021 at Department of Hematology, King Edward Medical University, in affiliation with Neonatal Intensive Care Unit; Department of Pediatric Medicine, Mayo Hospital, Lahore.

Approval for this study was obtained from the ethical review committee of King Edward Medical University, Lahore (101/RC/KEMU). Written, informed consent was obtained from the mothers/ attendants of all the enrolled neonates.

Non-probability consecutive sampling technique was used. During this study, 90 full term neonates (>37 weeks gestation on antenatal USG) admitted to NICU fulfilling the operational definition of neonatal sepsis were enrolled in this study. Neonates who had low birth weight (<2.5Kg), history of asphyxia during delivery (APGAR score < 7/10 at 5 minutes), family history of any bleeding disorder, trisomy, turner syndrome or history of anti-platelet therapy during pregnancy and SLE, ITP/ other autoimmune disorders in the mother were excluded from the study.

1.6 mL of neonatal blood was obtained by venipuncture in an EDTA anticoagulant vaccutainer for laboratory testing and transported to lab for further processing. The sample was run on XN-1000 Automated Hematology Analyzer (SYSMEX Corporation, USA).

The variable under study was platelet count. Peripheral blood smear was prepared using Giemsa stain and platelet count was verified.

Thrombocytopenia was defined as platelet counts <150,000/μL.[15]

After compilation of data, statistical analysis was performed using SPSS version 26 software. Variables under study, the Platelet count was expressed as Mean ± SD. Qualitative variables like gender and thrombocytopenia were presented as frequencies and percentages. The effect modifiers including age at onset of sepsis and gender were controlled by stratification. Post stratification Chi-square test was used as test of significance. P- value <0.05 was considered statistically significant.

RESULTS

In our study, there were total 90 neonates, all the cases were full term with mean gestational age 38.96 ± 0.94 weeks. (Table-I) Age of the patients ranged from 1 day of life to 27 days of life with the mean age of 7.89 ± 9.70. (Table-II) There were 65 (72%) male and 25 (28%) female neonates in our study (Figure-1). Mean ± SD birth weight was 2.80 ± 0.30 kg. EOS was present in 58 (64%) cases, while LOS was present in 32 (36%) cases (Figure-2). 30 neonates (33%) were delivered by normal vaginal delivery and 60 (66%) were delivered by caesarean section (Figure-3).

Mean value of platelet count was 123.26 ±106.59 in septic neonates. (Table-I) Thrombocytopenia was present in 68 (76%) patients. (Table-II), 22% cases had the normal platelet count whereas, thrombocytosis was found in 4 (4.40%) cases. Among all thrombocytopenic neonates, 14.70% babies had severe thrombocytopenia (Platelet count <50,000/UL). There was statistically significant relation between thrombocytopenia and EOS. Thrombocytopenia was present in 50 (86%) cases of EOS and 18 (56%) cases of LOS, P-Value = 0.002 (Table-III) There was no

significant association.

	Mean ± SD
Age at onset of sepsis (days)	7.89 ± 9.70
Platelet count (10^3/uL)	123.26 ±106.59
MPV (fL)	9.622 ± 2.267
PDW (fL)	18.0 ± 1.426
Birth Weight (kg)	2.80±0.30

Table-I

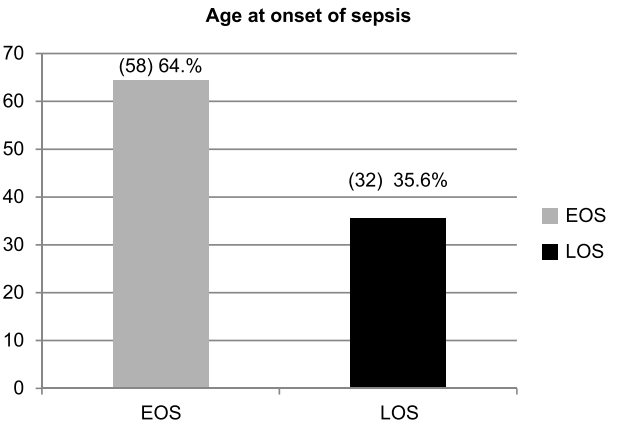

Figure-2. Frequency of EOS and LOS

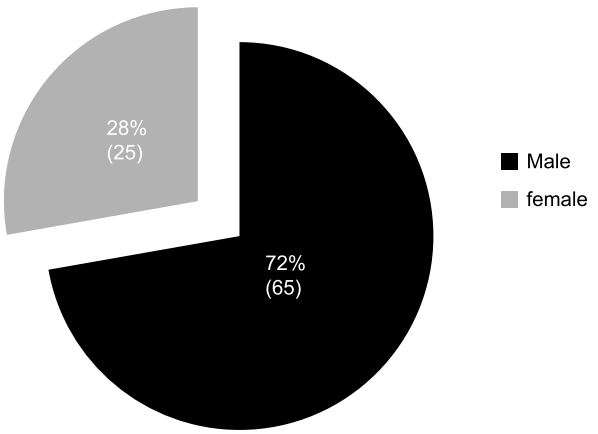

Figure-1. Frequency of male and female

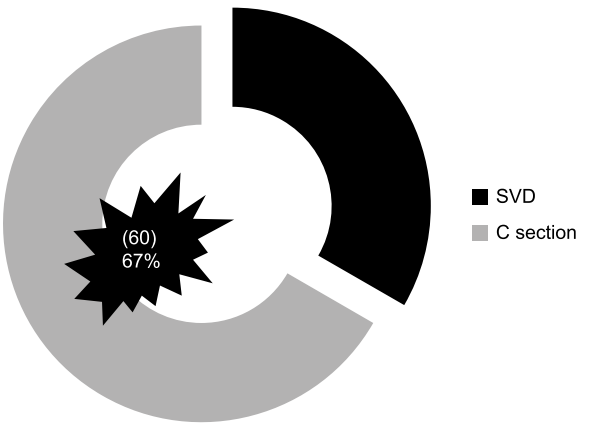

Figure-3. Frequency of mode of delivery

Variables Under Study	Yes (No. of Cases)	No (No.of Cases)	Total (No.of Cases)	Frequency	Cumulative Percent
Thrombocytopenia <150×10 ^{3} /uL)	68	22	90	68	75.6%

Table-II. Frequency of thrombocytopenia in neonatal sepsis.

Variables		No Thrombocytopenia (No. of Cases)	Thrombocytopenia (No. of Cases)	Total No. of Cases	P-Value
Gender	Male	17	48	65	>0.05 (Not significant)
	Female	05	20	25	
	Total	22	68	90	
Age at onset of sepsis	EOS	08	50	58	.002 (Significant)
	LOS	14	18	32	
	Total	22	68	90	

Table-III. Significance between various factors and thrombocytopenia.

DISCUSSION

In this study, we included 90 patients with sepsis to determine the frequency of thrombocytopenia. This was a prospective cross-sectional study which was conducted in a well equipped tertiary care unit.

Platelet count is frequently measured in blood samples collected in ethylenediaminetetraacetic acid (EDTA). Factor like shistocytes, platelet clumps, platelet satellitism, giant platelets affect platelet count from automated analyser. Peripheral smear examination was done to verify our findings.

All the patients in our study were full term, mean age at onset of sepsis was 7.89 ± 9.70 days and mean birth weight was 2.80 ± 0.30 kg. In a study by Kausar M et al, mean age was 12.35 ± 4.68 days. In our study, 30 (33%) neonates were delivered by SVD and 60 (66%) were delivered by C-section. Kousar M et al, reported 50.59% neonates delivered by SVD and 49.41% neonates delivered by C-section. There were 65 (72%) male and 25 (28%) female neonates in our study. In another study by Mittal et al. there were 52% males and 47.8% females with sepsis that was similar to our study. In another study by Bhat Y R et al., there were 64.1% male neonates and 35.9% female neonates.[16]

EOS was present in 58 (64%) patients, while LOS was present in 32(36%) patients. In a local study by Ahmed M et al[17], EOS was present in 57.4% babies whereas, LOS was found in 42.6% babies which is similar to our study. In another study conducted by Mittal A et al., the percentage of LOS cases 54.7% was slightly more than EOS cases (45%) This difference could be explained due to long turnaround time of EOS cases, increased mortality rate, cultural differences or decrease in the incidence of EOS in developed countries due to screening of group B streptococcus (GBS) in pregnant women and intrapartum antibiotic prophylaxis (IAP).[18]

Mean value of platelet count in our study was found to be 123.26 ± 106.59×10^3. Chaudhary et al.[19] found mean value of platelet count in sepsis positive neonates to be 123±51×10^3, which is similar to our study. In our study, thrombocytopenia was present in 75% patients. In a study by Karne KT et al[20]., thrombocytopenia was present in 57% of septic neonates. In another study by Jeremiah Z et al., thrombocytopenia was present in 59% of septic neonates admitted in neonatal intensive care unit Prevalence of thrombocytopenia in neonatal sepsis is highly variable with different values reported across the globe In our study, severe thrombocytopenia was present in 14.7% patients. Charoo BA et al. found[21] out that 12.5% developed severe thrombocytopenia.

Our study showed thrombocytopenia was present in 50 (86%) patients with EOS and 18 (56%) patients with LOS. Rabindran et al[22] observed the prevalence of thrombocytopenia of about 56.94% among late onset sepsis whereas among early onset neonatal sepsis it was 48.38% while Jeremiah ZA et al[23] noted the prevalence of thrombocytopenia among early onset sepsis 84.84%. Results in our study are exactly in line with these findings. There was no significant association of thrombocytopenia with gender in our study. (P value> 0.05) There was no significant relation of platelet count with gender in a study by Mittal A et al.[24]

Overall, our current study revealed increased frequency of thrombocytopenia in septic neonates. Among the variables examined, the time after the onset of infection had the most significant effect on the platelet count.

CONCLUSION

It was observed that the study of platelet count is an important indicator of septicemia and not related with blood culture and sensitivity. In the present study we found that Platelet count can be used to screen neonate with sepsis, especially in at risk neonates which is cost effective and available in almost all hospitals.

Apart from that, attention should be paid on the early detection of thrombocytopenia and in the newborns hospitalized at the NICU because development of severe infection and at the same time mortality in the high risk group of the

newborn can be prevented.

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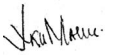
AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Hafsa Malik	Main Author, Research work, Data collection & Results.	
2	Maryam Malik	Data analysis and References.	
3	Sobia Ashraf	Discussion, Supervision of the research work.