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FREQUENCY OF THROMBOCYTOPENIA IN NEONATES WITH SEPSIS PRESENTING AT TERTIARY CARE HOSPITAL

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Abstract

Background: Neonatal sepsis is a serious morbid and mortality cause in all countries across the globe and is often linked to hematological pathophysiology, especially thrombocytopenia. Septic neonates should have thrombocytopenia as it can exacerbate the clinical outcomes; yet, there is a paucity of local data on the prevalence of thrombocytopenia. **Objective:** To establish the prevalence of thrombocytopenia among neonates in neonatal sepsis patients admitted in a tertiary care unit. Methods: The study was a descriptive, cross-sectional, study in the Department of Pediatrics in Hayatabad Medical Complex, Peshawar, during a six-month period upon receiving the (CPSP)Ref N0 CPSP/REU/PED/2022/021/7227 HMC approval 1840 Dated 22-05-2024. The non-probability consecutive sampling was used to enroll 171 neonates with a diagnosis of neonatal sepsis at an age between 1-28 days. Thrombocytopenia was considered a platelet count of less than 150, 000/uL in complete blood count. The analyses were done in IBM SPSS version 27. Categorical variables were computed with frequencies and percentages and relationships with the Chi-square test where p 0.05 was regarded as significant. **Results:** There were 171 neonates out of whom 96 (56.1) were male and 75 (43.9) female. The frequency of thrombocytopenia was 71.9 and was found in 123 neonates. Male, neonates (age 1-7 days), and rural area were more likely to be associated with thrombocytopenia ($p = 0.48$, $p = 0.62$, and $p = 0.39$, respectively); nonetheless, there was no statistically significant relationship between gender, age group, and area of residence and thrombocytopenia. **Conclusion:**

Thrombocytopenia is one of the hematological disorders in infants with sepsis. Platelet counts in the septic neonates should also be monitored on a regular basis in order to detect them early so that they can be handled in time to avoid complications.

INTRODUCTION

Neonatal sepsis is a systemic infection occurring within the first 28 days of life and remains a major contributor to neonatal morbidity and mortality worldwide.^1 The incidence varies according to diagnostic criteria and population characteristics, and has been reported to range from 1 to 5 per 1000 live births.^2 Clinical manifestations may range from mild illness to severe multisystem involvement, and causative organisms may originate from maternal flora (vertical transmission) or from hospital and community sources (horizontal transmission).^3 Fleischmann et al. reported that neonatal sepsis continues to impose a considerable global burden, with variable survival trends influenced by gestational age and healthcare resources.^4 Platelets play a central role in hemostasis and thrombus formation; however, in sepsis, inflammatory mediators and endothelial activation contribute to platelet consumption, increased destruction, and impaired thrombopoiesis.^5,6 As a result, thrombocytopenia is frequently observed in septic neonates and is considered one of the most common haematological abnormalities encountered in neonatal critical care.^7 Sepsis-related thrombocytopenia is multifactorial and may occur due to disseminated intravascular coagulation with direct platelet consumption, immune-mediated platelet destruction, bone marrow suppression, and platelet sequestration secondary to microvascular thrombosis and hemodynamic instability.^8–10 Malik et al. reported thrombocytopenia in approximately 75% of neonates with sepsis, highlighting its high frequency and clinical relevance.^11 Despite its importance, local literature regarding the burden of thrombocytopenia among septic neonates remains limited in our setting. Determining its frequency may support early recognition, timely investigations, and targeted interventions to reduce complications and improve neonatal outcomes. Therefore, this study aims to determine the frequency of thrombocytopenia in neonates diagnosed with sepsis presenting at a tertiary care hospital.

METHODS

This **descriptive cross-sectional study** was conducted in the **Department of Pediatrics, Hayatabad Medical Complex, Peshawar** over a period of **six months Date 08 June 2024 to 07 December 2024** (CPSP)Ref N0 CPSP/REU/PED/2022/021/7227 HMC approval 1840 Dated 22-05-2024 A total of **171 neonates** aged **1–28 days** diagnosed with **neonatal sepsis** were enrolled using **non-probability consecutive sampling**, with the sample size calculated through the **WHO sample size calculator** assuming an expected frequency of thrombocytopenia of **75%**, **95% confidence level**, and **6.5% margin of error**. Neonates of either gender were included, while those with **low birth weight, birth asphyxia, or congenital heart disease** were excluded. After obtaining approval from the institutional ethical review committee, **written informed consent** was taken from

parents or guardians. Baseline demographic data including **age, gender, and area of residence** were recorded on a predesigned proforma. Blood samples were analyzed as part of routine investigations, and **thrombocytopenia was defined as a platelet count <150,000/µL** on complete blood count. Data were entered and analyzed using **IBM SPSS version 27**, where numerical variables were expressed as **mean ± standard deviation** and categorical variables as **frequencies and percentages**. Thrombocytopenia was stratified according to **age groups, gender, and area of residence** to assess effect modifiers, and **Chi-square or Fisher's exact test** was applied as appropriate, with a **p-value ≤0.05** considered statistically significant.

RESULT

A total of **171 neonates** with sepsis were included in the study; **96 (56.1%)** were males and **75 (43.9%)** were females, with most neonates belonging to the **1–7 days** age group (**102, 59.6%**), followed by **8–14 days** (**38, 22.2%**) and **15–28 days** (**31, 18.1%**), while **104 (60.8%)** were from rural areas and **67 (39.2%)** from urban areas. Overall, **thrombocytopenia was observed in 123 (71.9%)** neonates and was absent in **48 (28.1%)**. Thrombocytopenia was more frequent among males (**71/96, 74.0%**) compared to females (**52/75, 69.3%**), among neonates aged **1–7 days** (**76/102, 74.5%**) compared to **8–14 days** (**27/38, 71.1%**) and **15–28 days** (**20/31, 64.5%**), and among rural neonates (**77/104, 74.0%**) compared to urban (**46/67, 68.7%**); however, these differences were **not statistically significant** for gender (**p = 0.48**), age group (**p = 0.62**), or area of residence (**p = 0.39**).

Table 1: Baseline Characteristics and Frequency of Thrombocytopenia among Neonates with Sepsis (n = 171)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	96	56.1
Female	75	43.9
Age Group (days)		
1–7	102	59.6
8–14	38	22.2
15–28	31	18.1
Area of Residence		
Urban	67	39.2
Rural	104	60.8
Thrombocytopenia		
Present	123	71.9
Absent	48	28.1

Table 2: Association of Thrombocytopenia with Demographic Variables (n = 171)

Variable	Thrombocytopenia Present n (%)	Thrombocytopenia Absent n (%)	Total	p-value
Gender				
Male	71 (74.0)	25 (26.0)	96	0.48
Female	52 (69.3)	23 (30.7)	75	
Age Group (days)				
1–7	76 (74.5)	26 (25.5)	102	0.62
8–14	27 (71.1)	11 (28.9)	38	
15–28	20 (64.5)	11 (35.5)	31	
Area of Residence				
Urban	46 (68.7)	21 (31.3)	67	0.39
Rural	77 (74.0)	27 (26.0)	104	

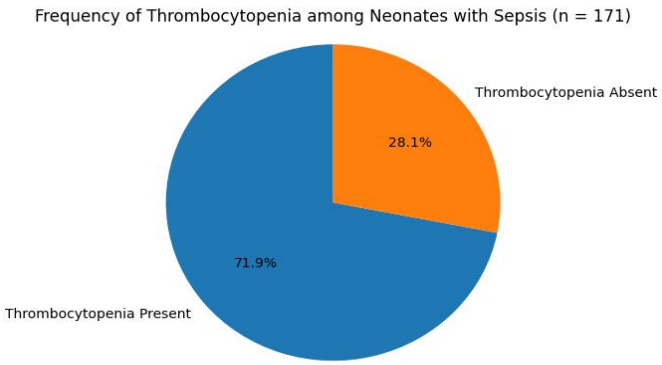

Figure 1: Frequency of Thrombocytopenia among Neonates with Sepsis (n = 171)

DISCUSSION

This present study, thrombocytopenia was observed in **71.9%** of neonates diagnosed with sepsis, demonstrating that it is a highly prevalent hematological abnormality in this population. This finding is consistent with previous studies that have reported a high frequency of thrombocytopenia among septic neonates, ranging between 50% and 75%, underscoring its strong association with neonatal sepsis. ^9,10 Malik et al. similarly reported thrombocytopenia in approximately 75% of neonates with sepsis, closely aligning with the findings of the current study. ^11 The high frequency of thrombocytopenia observed may be attributed to the complex pathophysiological mechanisms involved in sepsis. Sepsis-induced systemic inflammation leads to endothelial activation, platelet aggregation, increased platelet destruction, and impaired platelet production.^12,13 In addition, activation of the coagulation cascade and development of disseminated intravascular coagulation result in accelerated platelet consumption, further contributing to thrombocytopenia in septic

neonates.^14,15 In this study, thrombocytopenia was more frequently observed among **male neonates** compared to females; however, the association was not statistically significant. Similar observations have been reported in other studies, where gender did not show a consistent or independent association with thrombocytopenia in neonatal sepsis. ^16,17 This suggests that gender alone may not play a major role in the development of thrombocytopenia in septic neonates. Age-wise analysis showed a higher frequency of thrombocytopenia among **early neonates (1–7 days)** compared to older neonates, although this difference was not statistically significant. Early neonates are known to have an immature immune and hematopoietic system, which may predispose them to severe infections and associated hematological abnormalities. ^18,19 Previous studies have also demonstrated similar trends, indicating that early-onset sepsis may be associated with a greater degree of hematological derangement. ^9

Conclusion

Thrombocytopenia was more common among neonates from **rural areas** compared to urban areas, though the difference did not reach statistical significance. This finding may reflect disparities in perinatal care, delayed presentation, or higher burden of infections in rural settings; however, further analytical studies are required to establish a definitive association.^20 Overall, the absence of statistically significant associations between thrombocytopenia and demographic variables suggests that thrombocytopenia in neonatal sepsis is primarily related to the systemic effects and severity of infection rather than baseline demographic characteristics. These findings emphasize the importance of routine platelet count monitoring in all neonates with sepsis to facilitate early detection and timely management of thrombocytopenia.

Author Contributions

A. Ullah conceptualized and designed the study, collected data, analyzed the data, and drafted the manuscript. K. Fida contributed to the study design, data collection, and manuscript drafting. H. Iqbal assisted with data collection and analysis. A. Ahmed provided supervision, critically reviewed the manuscript for intellectual content, and approved the final version. K. Nadir contributed to data analysis and interpretation.

All authors approved the final manuscript and take responsibility for its accuracy and integrity.

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Conflict of Interest

The authors declare **no conflict of interest**.

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Study Limitations

This study has certain limitations. Being a **single-centre** study, the findings may not be generalizable to other healthcare settings. The **cross-sectional design** limits the ability to establish causal relationships between neonatal sepsis and thrombocytopenia. Additionally, disease severity, causative organisms, and clinical outcomes were not assessed, which may have provided further insight into the prognostic significance of thrombocytopenia.

Future Research Scope

Future studies with **multicentre designs and larger sample sizes** are recommended to improve generalizability. Prospective studies evaluating the **severity of thrombocytopenia**, its **association with clinical outcomes**, and its relationship with **microbiological profiles** of neonatal sepsis may help guide targeted management strategies and improve neonatal outcomes.

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