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Frequency of Thrombocytopenia in Neonatal Sepsis in NICU Combined Military Hospital Peshawar

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ABSTRACT

Background and Aim: Neonatal sepsis continues to be a major cause of morbidity and mortality in developing countries. It is one of the most frequent hematologic complications in neonatal sepsis and it could be useful clinical marker for the severity of the illness. The present study was conducted to find out the frequency of thrombocytopenia in neonates of sepsis managed at NICU, Combined Military Hospital (CMH) Peshawar. **Patients and Methods:** This was a cross-sectional study conducted on 139 neonates (1–28 days of age) presenting to NICU, CMH, Peshawar during October 2024 to March 2025, with clinically and laboratory proven sepsis. An electronic hematology analyzer determined platelet counts. Thrombocytopenia was diagnosed based on a platelet count less than 150,000/µL and classified as mild (100,000–149,000/µL), moderate (50,000–99,000/µL) or severe (<50,000/µL). Demographic and clinical details collected and analyzed by descriptive statistics. **Results:** Among 139 neonates with sepsis, 82 (59%) was found to be thrombocytopenia. Of these, mild thrombocytopenia was observed in 25 (30.5%), moderate in 36 (43.9%), and 21 (25.6%) severe in neonates. The prevalence was more with the preterm neonates and late-onset sepsis. Male neonates represented slightly more ratio of cases with thrombocytopenia. **Conclusion:** Thrombocytopenia is a common hematological finding in neonates with sepsis, affecting more than half of the affected population in the NICU. Routine monitoring of platelet counts in septic neonates recommended for early identification and management, potentially improving clinical outcomes and reducing complications.

INTRODUCTION

Neonatal sepsis defined as a blood flow infection in infants under 28 days and remains an important contributor to morbidity and mortality in this venerable population [1]. It is broadly classified into two types: Early-Onset Sepsis (EOS), which presents within the first 72 hours of life, and late-onset sepsis (LOS), which occurs after this initial period. Diagnosis usually depends on clinical indicators such as poor feeding, fever, lethargy and respiratory distress. Although blood culture considered the gold standard to confirm neonatal sepsis, it gives positive results only in 20% of cases [2]. Many factors including intrapartum antibiotic administration and inadequate blood samples can result in a result of false-negative conclusions. Additionally, turnaround time for culture results-which may be from 24 to 72 hours or more-a challenge to make clinical decisions on the time, alone underlines the need for initial empirical treatment rather than dependence on culture confirmation [3].

Thrombocytopenia, defined, as a platelet count below 150×10^3/µL, is a frequent complication observed in the neonatal intensive care units (NICU), contributing to adverse clinical outcomes in about 22–35% neonate's admission [4]. It is particularly prevalent among neonates with sepsis, where platelet abnormalities are usually noted. The main platelet indexes such as platelet volumes (MPVs), platelet distribution width (PDW), and plateletcrit (PCT) have significant clinical and prognostic values. When closely monitored, these parameters can support the early identity and ongoing management of neonatal sepsis, as well as evaluate the reaction of antibiotic therapy. Thrombocytopenia remains a major contributor to neonatal morbidity and mortality, which is accounting for 20–40% of NICU entry. Pathophysiology often involves the binding of infectious agents or immune complexes for platelets, leading to quick clearance from their aggregation and circulation [5].

Thrombocytopenia is more prevalent and persists for a long time in neonates associated with gram-negative or fungal infections. Neonates with thrombocytopenia increases the risk of frequent bacteria, multi-organs dysfunction and high mortality [6]. Sepsis recognized as one of the primary causes of thrombocytopenia in newborns, often with platelet counts rapidly fall within 24

to 48 hours of infection [7]. In terms of neonatal sepsis, thrombocytopenia significantly increases the risk of mortality. A study involving 6,551 newborns reported that 460 diagnosed with sepsis, and 10% of these (460 out of 460) performed thrombocytopenia, which highlights its remarkable frequency and clinical relevance in septic newborns [8].

Earlier study reported that about 20–35% of newborns entered NICUs, developing thrombocytopenia, which has confirmed more than 70% of those with sepsis [9]. Another study reported that 55% of newborns developed thrombocytopenia with culture-ride sepsis, with severe thrombocytopenia celebrated in 18% of cases [10]. The study also found a high proliferation among preterm and low birth weight infants. A study conducted in Pakistan confirmed thrombocytopenia in 58% newborns. Their findings also emphasized the importance of regular platelet monitoring for predicting the progression of the disease and the need for helpful management in serious cases [11]. Given the lack of local data, especially in military hospitals where patients demographic and risk factors varies, this study is timely and relevant. It contributed to the growing body of knowledge by determining the frequency of thrombocytopenia in the neonatal sepsis within the NICU of CMH Peshawar.

METHODOLOGY

Study Design and Setting

This cross-sectional study was conducted in the Pediatrics Department of Combined Military Hospital (CMH), Peshawar during October 2024 to March 2025, after obtaining ethical approval from the Institutional Review Board (IRB) and the College of Physicians and Surgeons Pakistan (CPSP). The research was hospital-based and done at the neonatal intensive care unit (NICU) in CMH Peshawar. The purpose was to determine the frequency of thrombocytopenia among newborns diagnosed with sepsis.

Sample Size

The sample size calculated using a standard sample size formula by considering the previously reported prevalence of thrombocytopenia in newborn sepsis 10% and level of confidence 95% with a margin of an error of 5%. One hundred thirty nine (n=139) neonates who met the inclusion criteria enrolled during the study period.

Inclusion and Exclusion Criteria

All neonates aged between 1 to 28 days, of either gender, diagnosed with sepsis as per the operational definition, were included in the study. Neonates with known causes of thrombocytopenia other than sepsis—such as congenital infections, immune thrombocytopenic purpura (ITP), or maternal drug exposure excluded to eliminate potential confounding factors.

Data Collection Procedure

After obtaining informed consent from parents, demographic information, including age, gender, socio-economic status, residence and parents' education recorded using a structured proforma. For laboratory examination, 1.6 mL venous blood drawn from each neonate using standard decay techniques. Blood collected in an EDTA anticoagulant vacutainer for complete blood count (CBC) analysis, including platelet count. Additionally, a separate sample was vaccinated in a bottle of blood culture and sent to the hospital's laboratory to identify the development of bacteria to confirm the diagnosis of sepsis. The diagnosis of thrombocytopenia was below 150 × 10 µ/µl depending on platelet count.

Data Analysis

The data was analyzed using the SPSS version 26. Quantitative variables such as age and platelet count expressed as ± standard deviation (SD) or median with ingestion range (IQR), which depends on the normality of distribution as evaluation by campiro-wilk test. Qualitative variables such as gender, socio -economic status, residence, educational status of the parents, and the presence of thrombocytopenia presented as frequencies and percentage. The effect modifier, including onset of sepsis and gender controlled through stratification. Post-stratification fisher applied as suitable for assessing statistical importance. A P-Value. 0.05 considered statistically important.

RESULTS

A total of 139 neonates diagnosed with sepsis were included in the study. Of these, thrombocytopenia was found in 82 newborns (59%). Thrombocytopenia was more common in preterm neonates (68.2%) and those with late-onset sepsis (68.2%). Male neonates showed a slightly higher frequency of thrombocytopenia (60%) compared to females (57.8%). A higher prevalence observed in neonates with low birth weight and from rural areas. Socioeconomic and educational status of the parents appeared to influence the frequency, with higher rates in neonates from lower socioeconomic backgrounds and illiterate mothers. Thrombocytopenia presented with the severity and its relationship with various demographic and clinical parameters as shown in Table-I and Table-II.

Table 1

Severity of Thrombocytopenia among Neonates with Sepsis (n = 82)

Severity	Frequency (n)	Percentage (%)
Mild Thrombocytopenia	25	30.5%
Moderate Thrombocytopenia	36	43.9%
Severe Thrombocytopenia	21	25.6%
Total	**82**	**100%**

Table 2

Distribution of Thrombocytopenia by Clinical and Demographic Variables (n = 139)

Variable	Total (n)	Thrombocytopenia (n)	Percentage (%)
Gender			
Male	75	45	60.0%
Female	64	37	57.8%
Sepsis Onset			
Early-Onset Sepsis (≤72 hrs)	54	24	44.4%

Late-Onset Sepsis (>72 hrs)	85	58	68.2%
Gestational Age			
Preterm	66	45	68.2%
Term	73	37	50.7%
Birth Weight			
<2.5 kg	70	46	65.7%
≥2.5 kg	69	36	52.2%
Maternal Education			
Illiterate	50	32	64.0%
Middle	59	34	57.6%
Graduate	30	16	53.3%
Socioeconomic Status			
Low	61	41	67.2%
Middle	51	29	56.9%
High	27	12	44.4%
Residency			
Rural	80	52	65.0%
Urban	59	30	50.8%
Mode of Delivery			
Normal Vaginal Delivery	78	46	59.0%
Cesarean Section	61	36	59.0%

DISCUSSION

The present study mainly focused on the evaluation of the frequency and related factors of thrombocytopenia in neonates diagnosed with sepsis admitted to NICU at Combined Military Hospital, Peshawar. Our findings revealed a high proliferation of thrombocytopenia (59%) among septic newborns, corresponding to previous studies that report thrombocytopenia as a frequent hematological complexity of newborn sepsis [12]. The results underline many important associations with clinical and demographic factors. Thrombocytopenia was especially more prevalent among the preterm neonates (68.2%), which align with earlier literature that it suggests that immature hematopoietic and immune system in immature infants can contribute to increase in sensitivity to consumption or destruction of sepsis and related platelets [13].

The late-onset sepsis (LOS) group also demonstrated a similar rate of thrombocytopenia (68.2%), supporting the hypothesis that prolonged hospital stay, aggressive procedures, and nosocomial pathogens enhanced the risk of sepsis-related thrombocytopenia in this subgroup. Gender differences were minimal, although a slightly higher prevalence was observed among male neonates (60%) compared to females (57.8%). This minor discrepancy has been noted in other studies attributed to the slightly higher vulnerability of male infants to infections due to immunological factors [14, 15].

Low birth weight (LBW) neonates affected more often, possibly due to their immature physical defense and low platelet production. These findings correspond to studies that highlight birth weight as a major risk factor for adverse results in newborn sepsis, including thrombocytopenia [16, 17].

Newborns of rural areas and lower socio -economic backgrounds demonstrated much more incidents of thrombocytopenia. These patterns can reflect healthcare access, poor maternal nutrition and limited prenatal care services, which contribute to all newborn complications. In addition, maternal illiteracy correlated with high thrombocytopenia rates, reflecting the possible effect of maternal education on newborn health seeking behavior, hygiene practices, and early recognition of the disease. Similar findings reported in the earlier studies [18, 19].

Overall, these results highlight thrombocytopenia as a common and clinically important finding in septic newborns, especially in weaker subgroups. Septic can aid regular platelet monitoring in newborns, especially low birth weight, premature, and from the deprived background, complications and preliminary identity of better clinical management. Earlier studies reported similar results [20-22].

Thrombocytopenia was also more common in newborns with low birth weight and in those born to illiterate mothers, which suggests a strong relationship with maternal and environmental factors. Male newborns showed slightly more phenomena than women. These findings underline the early recognition and importance of monitoring of thrombocytopenia in septic newborns, especially in high -risk groups. Timely diagnosis and proper management can help reduce complications and improve newborn results.

CONCLUSION

The current study concluded that thrombocytopenia is a common hematological complication, admitted to the NICU at the military hospital, Peshawar with sepsis. Male newborns, low birth weight, and infants from rural areas also showed a high proliferation. These findings highlight the need for vigilant platelet monitoring in high -risk newborn populations to ensure early diagnosis and early management, reducing a potential morbidity and mortality related to neonatal sepsis.

REFERENCES

1. Arabdin, M., Khan, A., Zia, S., Khan, S., Khan, G. S., & Shahid, M. (2022). Frequency and severity of Thrombocytopenia in neonatal sepsis. *Cureus*. https://doi.org/10.7759/cureus.22665
2. Dahat, A., Nanoti, G., Chokhandre, M., & Bhandekar, H. (2023). The Etiological profile of neonatal Thrombocytopenia in neonates in neonatal intensive care unit: A cross-sectional study. *Cureus*. https://doi.org/10.7759/cureus.48422
3. Bhat Y., R., Kousika, P., Lewis, L., & Purkayastha, J. (2018). Prevalence and severity of Thrombocytopenia in blood culture proven neonatal sepsis: A prospective study. *Archives of Pediatric Infectious Diseases*, *6*(2). https://doi.org/10.5812/pedinfect.12471
4. Wajid, K. K., Zeb, A., Mohammad, A., Matloob, U., & Sardar, N. (2022). FREQUENCY OF THROMBOCYTOPENIA IN PREMATURE NEONATES WITH BACTERIAL SEPSIS. *Journal of Postgraduate Medical Institute*, *36*(2), 70-3. https://doi.org/10.54079/jpmi.36.2.2939
5. Malik, H., Malik, M., & Ashraf, S. (2022). Frequency of thrombocytopenia in neonatal sepsis. *The Professional Medical Journal*, *29*(12), 1846-1851. https://doi.org/10.29309/tpmj/2022.29.12.7173l
6. Resch, E., Hinkas, O., Urlesberger, B., & Resch, B. (2018). Neonatal thrombocytopenia—causes and outcomes following platelet transfusions. *European Journal of Pediatrics*, *177*(7), 1045-1052. https://doi.org/10.1007/s00431-018-3153-7

7. Ahmed, M., Yasrab, M., Khushdil, A., Qamar, K., & Ahmed, Z. (2018). Neonatal sepsis in a tertiary care hospital: bacteriological profile and its antimicrobial sensitivity. *Pakistan armed forces medical journal*, (6), 1654-1658.
8. Ree, I. M., Fustolo-Gunnink, S. F., Bekker, V., Fijnvandraat, K. J., Steggerda, S. J., & Lopriore, E. (2017). Thrombocytopenia in neonatal sepsis: Incidence, severity and risk factors. *PLOS ONE*, *12*(10), e0185581. https://doi.org/10.1371/journal.pone.0185581
9. Arya, S., Mittal, A., Charan, L., Saluja, S., & Chellani, H. (2018). Evaluation of platelet indices as additional diagnostic tool for neonatal sepsis. *Astrocyte*, *4*(4), 205. https://doi.org/10.4103/astrocyte.astrocyte_8_18
10. Parakh, H., JK, R., & Reddy, P. (2014). Prevalence and course of Thrombocytopenia in culture positive and culture negative neonatal sepsis. *Pediatric Review: International Journal of Pediatric Research*, *1*(3), 60-66. https://doi.org/10.17511/ijpr.2014.3.001
11. Arif, H., Ikram, N., Riaz, S., & Nafisa, A. (2020). Risk factors and outcome of neonatal Thrombocytopenia. *Journal of Rawalpindi Medical College*, *24*(3), 229-234. https://doi.org/10.37939/jrmc.v24i3.1331
12. Choudhary, D., Tiwari, A. K., Narang, D., & Chhabra, J. (2017). Correlation of platelet count and platelet indices with neonatal sepsis-diagnostic and prognostic indicator. *Pediatric Review: International Journal of Pediatric Research*, *4*(8), 511-518. https://doi.org/10.17511/ijpr.2017.i08.03
13. Karne, T. K., Joshi, D. D., Zile, U., & Patil, S. (2017). Study of platelet count and platelet indices in neonatal sepsis in tertiary care institute. *MVP Journal of Medical Sciences*, 55-60. https://doi.org/10.18311/mvpjms/2017/v4i1/701
14. Jeremiah, Z., & OBURU JUSTINA EGWUMA. (2010). Pattern and prevalence of neonatal thrombocytopenia in Port Harcourt, Nigeria. *Pathology and Laboratory Medicine International*, 27. https://doi.org/10.2147/plmi.s9968
15. Kausar, M. U. Z. A. M. M. I. L., Salahuddin, I. M. R. A. N. A., & Naveed, A. T. I. A. (2020). Examine the frequency of thrombocytopenia in newborns with neonatal Sepsis. *Age (days)*, *12*, 4-68.
16. Gandhi, P., & Kondekar, S. (2019). A review of the different Haematological parameters and biomarkers used for diagnosis of neonatal sepsis. *EMJ Hematology*, 85-92. https://doi.org/10.33590/emjhematol/10313792
17. Sindhura, Y. S., & Reddy, K. R. (2017). A study of neonatal thrombocytopenia in neonatal sepsis. *Int J Contemp Med Res*, *4*(11), 2250-2.
18. Noreen, N., Amanat, S. T., Noreen, S. A. N., Amanat, S. T., & Ali, S. (2019). Thrombocytopenia in neonatal intensive care unit and role of platelet transfusion. *Journal of Rawalpindi Medical College*, *23*(2).
19. Addil, F., Rehman, A., Najeeb, S., Imtiaz, H., & Khan, S. (2021). Neonatal sepsis: the frequency of thrombocytopenia. *Sys Rev Pharm*, *12*(11), 3460-2.
20. Levit, O., Bhandari, V., Li, F. Y., Shabanova, V., Gallagher, P. G., & Bizzarro, M. J. (2014). Clinical and laboratory factors that predict death in very low birth weight infants presenting with late-onset sepsis. *The Pediatric infectious disease journal*, *33*(2), 143-146. https://doi.org/10.1097/INF.0000000000000024
21. Shahalam, S., Iqbal, M., Hassan, S., Rizwan, S., Waseem, R., & Rehman, R. (2024). Thrombocytopenia Rates In Newborns Diagnosed With Gram-Negative Sepsis. Insights From NICU Experimental Based Study. *Journal of Rawalpindi Medical College*, *28*(4). https://journalrmc.com/index.php/JRMC/article/view/2654
22. Khan, M. K., ur Rehman, S., Gul, H., Ullah, F., & Wajid, U. (2025). Frequency and Severity of Thrombocytopenia in Neonatal Sepsis at Bacha Khan Medical Complex/Gajju Khan Medical College, Sawabi. *Review Journal of Neurological & Medical Sciences Review*, *3*(1), 57-66. https://doi.org/10.62019/zff7vm45