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A Study to Estimate the Prevalence of Thrombocytopenia in Neonates Admitted in NICU and Evaluate the Effect of Platelet Transfusion on Neonatal Outcome

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Abstract

Introduction: Thrombocytopenia, defined as a platelet count of less than $150 \times 10^9/L$, is common among neonates, particularly those in Neonatal Intensive Care Units (NICUs), with an occurrence rate of up to 30%. Neonates often receive platelet transfusions, many of which may be unnecessary. This study aimed to evaluate the prevalence of thrombocytopenia, its causes, and the effect of platelet transfusions on neonatal outcomes in NICU admissions at Saraswathi Institute of Medical Sciences, Hapur, UP.

Objectives:

1. To estimate the prevalence of thrombocytopenia in neonates admitted to NICU.
2. To assess the common causes of neonatal thrombocytopenia.
3. To evaluate neonatal outcomes in thrombocytopenic patients following platelet transfusion.

Methods: This cross-sectional study was conducted from August 2022 to July 2024 at the Saraswathi Institute of Medical Sciences. A total of 500 neonates admitted to the NICU were included. Neonates with various conditions were excluded based on predefined criteria. Data on maternal history, neonatal demographics, and clinical characteristics were collected. Platelet counts were measured on the first, third, and fifth day of life. Statistical analyses were performed to determine the associations between clinical variables and thrombocytopenia severity.

Result: Out of 500 neonates, 126 (25.3%) had thrombocytopenia. Of these, 99 cases (19.8%) were early-onset and 27 cases (5.4%) were late-onset. Thrombocytopenia was more common in preterm, low birth weight (LBW), and small for gestational age (SGA) neonates. Significant associations were found between thrombocytopenia and maternal conditions such as pregnancy-induced hypertension (PIH), as well as neonatal conditions like sepsis, gastrointestinal bleeding, and intraventricular hemorrhage (IVH). Among neonates with thrombocytopenia, those receiving platelet transfusions had higher severity of the condition. The mortality rate among thrombocytopenic neonates was 6.3%, with severe thrombocytopenia being a significant factor.

Conclusion: Thrombocytopenia in neonates is prevalent in NICUs and is significantly associated with prematurity, LBW, SGA status, and maternal PIH. The severity of thrombocytopenia impacts neonatal outcomes, with severe cases leading to higher mortality. Effective guidelines and protocols for platelet transfusion are essential to improve neonatal care and minimize unnecessary donor exposure.

Keywords: Neonatal thrombocytopenia, NICU, platelet transfusion, preterm neonates, low birth weight, pregnancy-induced hypertension

Introduction

A platelet count of less than $150 \times 10^9/L$ is known as thrombocytopenia, and it is a common condition among newborns. Thrombocytopenia can occur in up to 30% of NICU patients at some point during their hospital stay [3-6]. Patients in intensive care units (NICUs) often receive platelet transfusions, which may be needless [7]. More guidelines are needed for safe platelet

transfusion lower limits in sick and stable newborns, efficient platelet transfusion protocols in sick neonates, and better treatment for illnesses that cause thrombocytopenia^[7]. About 25% of newborns with thrombocytopenia receive one or more transfusions, while the majority have a minor drop in platelet count and recover with proper treatment of the underlying cause^[8]. The prevalence and etiology of thrombocytopenia in newborns from India are poorly understood. The goal of the current study was to determine the prevalence of thrombocytopenia and whether there was any correlation between the clinical state and platelet transfusion in neonates. This information would have been useful in the development of guidelines and/or protocols for the appropriate transfusion of platelets in neonates, thereby minimizing donor exposure.

Thrombocytopenia, characterized by a platelet count below 150,000/ μ L, is a common hematological problem in Neonatal Intensive Care Units (NICUs), affecting 18–35% of NICU patients before they are discharged. Aside from anemia caused by phlebotomy, it is the most frequent blood disorder seen in NICUs. This condition is particularly prevalent among preterm infants (with a gestational age of 34–36 weeks or less), critically ill neonates, and extremely low birth weight infants (weighing 1000 grams or less at birth). In contrast, thrombocytopenia affects only about 2% of all newborns, and severe thrombocytopenia (platelet count under 50,000/ μ L) occurs in fewer than 3 out of every 1000 full-term infants.

Neonatal thrombocytopenia, defined as a platelet count below 150,000/ μ L, is categorized into three levels: mild (100,000–150,000/ μ L), moderate (50,000–99,000/ μ L), and severe (less than 50,000/ μ L). It affects 0.7% to 0.9% of all newborns, but its prevalence rises to 22% to 35% among NICU patients.

Early onset thrombocytopenia develops within the first 72 hours of life, primarily due to placental insufficiency, leading to decreased platelet production. These cases are generally mild to moderate, and the infants usually remain clinically stable. Most instances resolve spontaneously within 7–10 days without the need for further intervention.

Late onset thrombocytopenia, occurring after the initial 72 hours, can be caused by conditions such as fungal or bacterial sepsis, necrotizing enterocolitis (NEC), and viral infections. Infants with late onset thrombocytopenia often appear ill and present with other symptoms indicative of sepsis or NEC.

Materials and Methods

Study Area

The study was carried out in Department of Pediatrics, Saraswathi Institute of Medical Sciences, Hapur, UP

Study Population

All newborn babies admitted in NICU

Study Duration: 2 Years (August 2022 to July 2024)

Study Type: Cross sectional Study

Sample size: 500 neonates

Inclusion criteria

All newborn babies admitted in NICU.

Exclusion Criteria

1. Babies with any of the following will be excluded:
2. Maternal drug history like isoniazid, phenobarbiton, rifampicin, or status unknown.
3. Family H/o bleeding disorder in siblings/ family member
4. Any congenital anomaly
5. Intra uterine infection eg: TORCH

Methodology

After taking clearance from Institutional Ethical committee clearance, this descriptive study was done in All newborn babies admitted in NICU

The data collected was entered in Microsoft Excel and will be imported in IBM SPSS v 25.0.

The collected data was analyzed by appropriate statistical tools & techniques and tests such as mean $\pm$ standard deviation (SD), paired t-test, graphical representation of data, frequency distribution, etc. A p value less than 0.05 was taken as statistically significant.

Results

Among male neonates, 192 (77.4%) did not exhibit thrombocytopenia, while 56 (22.6%) did. Similarly, among female neonates, 182 (72.2%) did not have thrombocytopenia, whereas 70 (27.8%) did. The chi-square test yielded a value of 1.79 with a corresponding p-value of 0.18, suggesting that there is no statistically significant association between gender and the presence of thrombocytopenia among neonates in the NICU.

In term neonates, 319 (79.4%) did not have thrombocytopenia, while 83 (20.6%) did. Conversely, among preterm neonates, 55 (56.1%) did not exhibit thrombocytopenia, whereas 43 (43.9%) did and in low birth weight (LBW) neonates, 204 (70.8%) did not have thrombocytopenia, while 84 (29.2%) did. In contrast, among neonates with normal birth weight, 170 (80.2%) did not have thrombocytopenia, while 42 (19.8%) did.

Among low birth weight (LBW) neonates, 49 (58.3%) had mild thrombocytopenia, 22 (26.2%) had moderate thrombocytopenia, and 13 (15.5%) had severe thrombocytopenia. Similarly, among neonates with normal birth weight, 22 (52.4%) had mild thrombocytopenia, 11 (26.2%) had moderate thrombocytopenia, and 9 (21.4%) had severe thrombocytopenia.

Among neonates admitted to NICU, categorized by the presence or absence of severe perinatal asphyxia. Among neonates with severe perinatal asphyxia, 12 (66.7%) exhibited thrombocytopenia, while 6 (33.3%) did not. Conversely, among neonates without severe perinatal asphyxia, 114 (23.7%) had thrombocytopenia, with 368 (76.3%) not showing signs of thrombocytopenia.

Among the neonates with IVH, 10 cases were recorded: 1 case (10.0%) did not have thrombocytopenia, while 9 cases (90.0%) did. Conversely, in neonates without IVH, 490 cases were noted: 373 cases (76.1%) did not have thrombocytopenia, while 117 cases (23.9%) did. The chi-square value for this distribution is 22.7, with a p-value of 0.001.

Table 1

Onset of Thrombocytopenia		Thrombocytopenia			Total
		Mild	Moderate	Severe	
Early Onset (<72hr)	Count	66	31	2	99
	% within Type of Onset	66.7%	31.3%	2.0%	100.0%
Late Onset (>72 hr)	Count	5	2	20	27
	% within Type of Onset	18.5%	7.4%	74.1%	100.0%
Chi square: 76.4			p value:<0.001*		

Among neonates based on whether platelet transfusion was administered. Among neonates where platelet transfusion was not performed, 68 (71.6%) had mild thrombocytopenia, 23 (24.2%) had moderate thrombocytopenia, and 4 (4.2%) had severe thrombocytopenia. In contrast, among neonates

who received platelet transfusion, 3 (9.7%) had mild thrombocytopenia, 10 (32.3%) had moderate thrombocytopenia, and 18 (58.1%) had severe thrombocytopenia.

Table 2

Platelet transfusion		Thrombocytopenia		Total
		Absent	Present	
Not done	Count	374	95	469
	% within platelet transfusion	79.7%	20.3%	100.0%
done	Count	0	31	31
	% within platelet transfusion	0.0%	100.0%	100.0%
Chi square: 108.2			p value:0.010*	

Discussion

The present study was done with the aim of estimating the prevalence of thrombocytopenia in neonates admitted to the NICU and evaluate the effect of platelet transfusion on neonatal outcomes, the data revealed that out of the total neonates admitted, 374 (76.7%) did not exhibit thrombocytopenia. Among those who did, 71 (14.6%) had mild thrombocytopenia, 33 (6.8%) had moderate thrombocytopenia, and 22 (4.5%) had severe thrombocytopenia, totalling 126 cases of thrombocytopenia. In Jeremiah *et al.*, it was observed that 39.4% of the neonates had mild thrombocytopenia, 12.1% had moderate thrombocytopenia and 1.5% had severe thrombocytopenia

In our study Among the 10 neonates with IVH 9 cases (90.0%) had thrombocytopenia. Among neonates with IVH, 2 (22.2%) had mild thrombocytopenia, 3 (33.3%) had moderate thrombocytopenia, and 4 (44.4%) had severe thrombocytopenia. Similar to our finding, The main clinical concern for neonates with severe thrombocytopenia is the occurrence of major bleeding especially into the intraventricular and periventricular space The risk of major IVH-PVH is particularly high in premature neonates with a reported incidence of more than 25%.

In our study, among the neonates without transfusions, 68 (71.6%) had mild thrombocytopenia, 23 (24.2%) had moderate thrombocytopenia, and 4 (4.2%) had severe thrombocytopenia. In contrast, in the transfused group, 3 (9.7%) had mild thrombocytopenia, 10 (32.3%) had moderate thrombocytopenia, and 18 (58.1%) had severe thrombocytopenia.

In our study, among neonates who had thrombocytopenia 8 (6.3%) died and 93.7% got discharge. Among neonates who died, 2 (25.0%) had mild, 2 (25.0%) had moderate, and 4 (50.0%) had severe thrombocytopenia. The chi-square test indicates a statistically significant association between thrombocytopenia severity and the final outcome among neonates ($\chi^2 = 6.6$, $p = 0.036^*$), suggesting that the severity of thrombocytopenia may influence the neonatal outcome, with a higher proportion of severe cases observed among deceased.

Conclusion

It was observed that the predominance of thrombocytopenia was high (25 %) and that of extreme thrombocytopenia was 4%. The inclining factors related with neonatal thrombocytopenia were Maternal PIH, age at show, NEC and helped ventilation. Extremely, IUGR, rashness and perinatal asphyxia were not related with neonatal thrombocytopenia in our review.

Draining of any kind either mucosal, cutaneous or intra cranial was essentially connected with extreme thrombocytopenia. Deferred slender top off was the most widely recognized sign other than draining was related with thrombocytopenia. Death rate and poor neurodevelopmental result were undeniably more normal in the serious thrombocytopenic bunch. Besides low platelet count was viewed as a free gamble factor for an unfortunate result in our NICU graduates.

Consequently, it tends to be presumed that thrombocytopenia is a lot of normal among our NICU confirmations. Septicemia is its most significant and most normal reason. Different maternal and neonatal elements can be related with thrombocytopenia. Unfortunate result both prompt and present moment are particularly connected with extreme thrombocytopenia at show.

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