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Original Article

Clinical Profile of Neonatal Thrombocytopenia in a Tertiary Care Hospital

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ABSTRACT

0***Introduction:*** *Neonatal thrombocytopenia, defined as a platelet count <150×10^9/L, is a common hematological disorder that can lead to significant morbidity and mortality in neonates, especially in severe cases. This study aimed to evaluate the clinical profile of neonatal thrombocytopenia and identify its associated causes in a tertiary care setting.* ***Methods & Materials:*** *A cross-sectional, observational study was conducted over one year (January 2021 to December 2021) in the NICU of Dhaka Shishu Hospital and Central International Medical College. A total of 96 neonates with thrombocytopenia were included after excluding four due to early discharge. Data on demographics, perinatal factors, and clinical conditions were collected, and statistical analysis was performed using SPSS version 21.* ***Results:*** *Of the 96 neonates, 61% were male. The mean age was 2.24 ± 0.707 days, and the mean birth weight was 2222.76 ± 628.281 grams. Poor feeding, respiratory distress, and abnormal neonatal reflexes were common in neonates with platelet counts below 100,000. Sepsis was significantly associated with thrombocytopenia, and C-reactive protein (CRP) levels were higher in neonates with lower platelet counts. Preterm low birth weight (LBW) and meconium aspiration syndrome (MAS) were the most frequent diagnoses among thrombocytopenic neonates.* ***Conclusion:*** *Neonatal thrombocytopenia is closely associated with conditions such as sepsis, prematurity, and respiratory complications. Early identification and timely intervention are crucial for improving outcomes. Further studies with larger sample sizes and long-term follow-ups are needed to explore the long-term*

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INTRODUCTION

Thrombocytopenia is one of the most common hematological disorders encountered in neonatal intensive care units (NICUs), affecting a significant proportion of newborns, particularly those who are critically ill[1]. It is defined as a platelet count of less than 150 × 10^9/L, which is lower than the normal range for healthy neonates[2]. The condition can be categorized into mild, moderate, and severe thrombocytopenia, depending on platelet count, with values between 100,000 and 150,000 considered mild, 50,000 to 100,000 as moderate, and counts below 50,000 classified as severe[3]. Although neonatal thrombocytopenia often resolves spontaneously without severe consequences, in some cases, it can lead to life-threatening complications, including intraventricular hemorrhage (IVH) and increased mortality, especially when platelet counts fall below 50,000[4].

The pathophysiology of neonatal thrombocytopenia mirrors that seen in adults and revolves around decreased platelet production, increased platelet destruction, or consumption, and hypersplenism[5]. In neonates, the condition is often linked to several perinatal factors, including prematurity, birth asphyxia, intrauterine growth retardation (IUGR), low birth weight (LBW), sepsis, and maternal complications such as preeclampsia or placental insufficiency[6]. Preterm neonates are particularly vulnerable due to their immature bone marrow and limited capacity to increase platelet production in response to increased consumption, which can make them more susceptible to developing thrombocytopenia in the face of illness or stress[7].

Neonatal thrombocytopenia can occur as either an early-onset (within the first 72 hours of life) or a late-onset condition (after 72 hours)[8]. Early-onset thrombocytopenia is often associated with maternal factors such as preeclampsia, IUGR, or placental insufficiency, while late-onset thrombocytopenia is more commonly linked to neonatal sepsis, necrotizing enterocolitis (NEC), or infections acquired after birth[9]. The identification of thrombocytopenia requires routine screening of platelet counts in at-risk neonates, especially those admitted to the NICU[10].

In low- and middle-income countries like Bangladesh, neonatal thrombocytopenia is a significant concern due to the high prevalence of risk factors such as prematurity, low birth weight, and neonatal sepsis[11]. Bangladesh faces considerable neonatal mortality and morbidity, with neonatal thrombocytopenia contributing to adverse outcomes. Although the exact incidence of neonatal thrombocytopenia in Bangladesh is not well documented, it is a prevalent condition in NICUs, where many newborns are admit-

ted with complications related to prematurity, birth asphyxia, sepsis, and maternal health issues[12]. Understanding the clinical profile of neonatal thrombocytopenia in this context is essential for timely diagnosis and management, as early identification of at-risk neonates can significantly improve outcomes by allowing prompt intervention to prevent severe complications[13].

Despite its frequency, the management of neonatal thrombocytopenia remains challenging, largely due to the lack of consensus on the appropriate threshold for initiating platelet transfusions[14]. Studies have shown that platelet transfusion practices vary widely across institutions, with some guidelines recommending transfusions for neonates with platelet counts below 50,000, while others suggest that transfusions should only be performed when there are clinical signs of bleeding[15]. The risk of bleeding, particularly IVH, is one of the main reasons clinicians are cautious when managing thrombocytopenia in neonates, especially in preterm infants who are at higher risk of this complication. However, overuse of platelet transfusions also carries risks, including transfusion-related infections, allergic reactions, and volume overload, which can exacerbate the condition[16].

The primary aim of this study was to evaluate the clinical profile and causes of neonatal thrombocytopenia in a tertiary care hospital in Bangladesh. This study sought to examine the demographic characteristics of neonates with thrombocytopenia, including age, sex, gestational age, and birth weight, as well as the clinical conditions associated with varying levels of platelet count. Additionally, the study aimed to identify the underlying causes of thrombocytopenia and determine the relationship between C-reactive protein (CRP) levels and platelet count as an indicator of infection. By evaluating the profile of neonates with thrombocytopenia, this research aims to provide valuable insights into the condition and help inform clinical decision-making for early diagnosis and effective management of affected newborns.

Methods & Materials

This study was a cross-sectional, descriptive, and observational investigation conducted on 100 neonates diagnosed with thrombocytopenia (platelet count: <150×109/L) admitted to the neonatal intensive care unit (NICU) of Dhaka Shishu Hospital and Central International Medical College from January 2021 to December 2021. Based on the platelet count it is classified into mild (<150×103-100×103/µL), moderate (99×103-50×103/µL), and severe (<50×103/µL). Neonates with chromosomal or genetic disorders and those born outside the hospital who received platelet transfusions in other NICUs were excluded from the study. Additionally, four patients who discontinued treatment and were discharged home were also excluded from the final analysis. The demographic data, including name, sex, gestational age, and birth weight, were collected from the parents or guardians of the enrolled neonates using a structured interviewer-

administered questionnaire. Blood specimens were obtained from each neonate for sepsis workup, which included total leukocyte count (TLC), platelet count, and C-reactive protein (CRP) estimation, prior to the administration of antibiotics. Data analysis was performed using the Statistical Package for Social Sciences (SPSS) version 21, employing the chi-square test and Fisher's exact test to assess associations between independent variables.

RESULTS

Figure 1 shows the sex distribution of our study participants. Out of the 96 neonates who remained adherent to the study 61% were male while the remaining 39% were female.

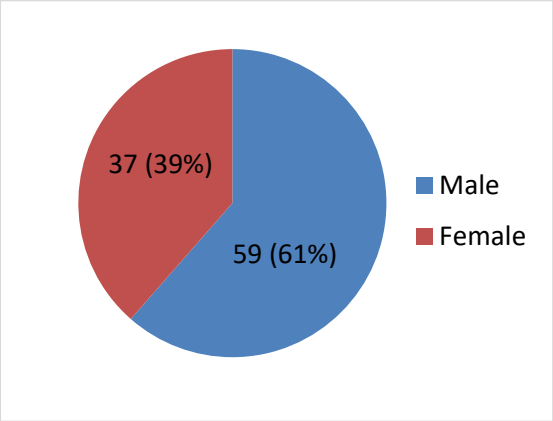

Figure 1: Sex Distribution (*n*=96)

Table I presents the demographic and perinatal information of the neonates included in the study. The mean age of the neonates was 2.24 ± 0.707 days, with an age range from 1 to 7 days. The mean birth weight was 2222.76 ± 628.281 grams, with weights ranging from 800 to 3280 grams. On average, mothers had undergone 1.67 ± 0.735 antenatal check-ups, with a range of 1 to 4 check-ups. The incidence of antepartum hemorrhage was observed 2.28 ± 0.517 times on average, with a range of 1 to 3 occurrences. Additionally, changes in the liquor color were recorded 1.31 ± 0.730 times, ranging from 1 to 3 instances.

Table I: Demographic information of the neonates

Perinatal data	Mean ± SD	Range
age in days	2.24 ± 0.707 days	1-7 days
Weight	2222.76 ± 628.281 gm	800 – 3280gm
Antenatal check up	1.67 ± 0.735 times	1-4 times
Antepartum hemorrhage	2.28 ± 0.517 times	1-3 times
Alter liquor color	1.31 ± 0.730 times	1-3 times

Table II shows the variation in clinical conditions based on platelet count levels. Apnoea was most common in neonates with platelet counts above 100,000 (25.0%) and less frequent in the 50,000-100,000 (4.2%) and <50,000 (8.3%) groups. Abnormal respiratory rates were more frequent in the higher platelet group, while poor feeding and impaired reflexes were also most prevalent in neonates with platelet counts above 100,000. A delayed capillary refill time (>3 seconds) and heart rate abnormalities were observed more often in the highest platelet group. Temperature irregularities, convulsions, and unconsciousness were seen in neonates with platelet counts >100,000 and <50,000. Hemoglobin levels were mostly normal in neonates with platelet counts above 100,000.

Table – II: Variation of Clinical Conditions Regarding Platelet Count

Clinical Condition	Platelet Count >100,000 (%)	Platelet Count 50,000-100,000 (%)	Platelet Count <50,000 (%)
Apnoea	25.00	4.20	8.30
Respiratory Rate			
<30 breaths/min	26.00	3.10	8.30
30-60 breaths/min	15.60	7.30	9.40
>60 breaths/min	15.60	6.30	8.30
Reluctant to Feed/Poor Feeding	57.30	16.70	26.00
Neonatal Reflexes	55.30	15.70	29.00
Capillary Refill Time (>3 sec)	43.80	6.30	6.30
Heart Rate			
60-160 beats/min	44.80	13.50	19.80
>160 beats/min	12.50	3.10	6.30
Temperature			
<97°F	37.50	0.00	12.50
98-99°F	16.70	10.40	13.50
>100°F	3.10	6.30	0.00
Convulsion	3.10	0.00	0.00
Unconscious	3.10	0.00	3.10
Hemoglobin			
<12 mg/dl	9.40	7.30	2.10
12-16 mg/dl	35.40	6.30	20.80
>16 mg/dl	12.50	3.10	3.10

Table III shows the distribution of neonatal diagnoses according to platelet count variations. Pneumonia (PNA) was diagnosed in 12.5% of neonates with platelet counts >100,000, 6.25% in the 50,000-100,000 group, and 10.4% in the <50,000 group. Preterm low birth weight (LBW) was most prevalent in the >100,000 group (20.8%), compared to 5.2% in the 50,000-100,000 group and 9.3% in the <50,000 group. Meconium aspiration syndrome (MAS) occurred in 9.3% of neonates with platelet counts >100,000, 4.1% in the 50,000-100,000 group, and 5.2% in the <50,000 group. Sepsis was observed in 5.2% of neonates with platelet counts >100,000, 7.29% in the 50,000-100,000 group, and 4.1% in the <50,000 group.

Table – III: Neonatal Diagnosis with Variations of Platelet Count

Diagnosis	Platelet Count >100,000 *n*(%)	Platelet Count 50,000-100,000 *n*(%)	Platelet Count <50,000 *n*(%)
Pneumonia (PNA)	12 (12.5)	6 (6.25)	10 (10.4)
Preterm Low Birth Weight (LBW)	20 (20.8)	5 (5.2)	9 (9.3)
Meconium Aspiration Syndrome (MAS)	9 (9.3)	4 (4.1)	5 (5.2)
Sepsis	5 (5.2)	7 (7.29)	4 (4.1)

Table IV shows the variation in C-reactive protein (CRP) levels in relation to platelet counts. Among neonates with a platelet count >100,000, 33 were CRP positive and 20 were CRP negative. In the 50,000-100,000 group, 11 were CRP positive and 7 were negative. For neonates with a platelet count below 50,000, 17 were CRP positive, while 8 were negative.

Table – IV: Variation of CRP and Platelet Count

Platelet count	CRP	
	Positive	Negative
>100000	33	20
50000-100000	11	7
<50000	17	8

DISCUSSION

Neonatal thrombocytopenia, characterized by a platelet count lower than 150,000/µL, is a common hematological issue in the neonatal intensive care unit (NICU). The present study showed that the most common causes of thrombocytopenia in neonates admitted to NICU were infections, preterm birth, and maternal complications. These findings are consistent with previous studies by Khalessi et al., who highlighted the significance of neonatal infections, preterm birth, and low birth weight as primary risk factors for thrombocytopenia in their cohort of neonates admitted to the NICU[17].

Infections, particularly neonatal sepsis, are a major cause of thrombocytopenia. The inflammatory response in sepsis leads to increased platelet consumption, which explains the strong correlation between CRP positivity and low platelet counts observed in this study. Younis et al. noted that CRP is often elevated in septic neonates, making it a useful diagnostic marker for sepsis, and indirectly linking it to thrombocytopenia[18]. In this context, CRP levels serve as both a marker of infection and an indicator of the potential for thrombocytopenia.

The role of maternal factors, including hypertensive disorders and placental insufficiency, was also noted in this study, reflecting findings by Eslami et al., who observed that maternal health complications can lead to thrombocytopenia due to impaired placental function and reduced fetal blood flow[19]. Such conditions predispose neonates to intrauterine growth restriction, predisposing them to lower platelet counts.

Preterm neonates are particularly vulnerable to thrombocytopenia due to their immature hematopoietic system, which compromises platelet production. Studies like those by Chandra et al. and Tirupathi et al. have demonstrated that preterm neonates often present with thrombocytopenia due to a combination of low birth weight, sepsis, and perinatal asphyxia[20,21]. Our study's findings echo these earlier observations, reinforcing the idea that preterm birth significantly predisposes neonates to thrombocytopenia, particularly in the presence of infections.

The clinical implications of thrombocytopenia in neonates include an increased risk of hemorrhage, especially in cases of severe thrombocytopenia. Schuchat et al. noted that early diagnosis and management are crucial for preventing severe outcomes such as intraventricular hemorrhage, which can have lasting neurological consequences[22]. In line with these findings, our study emphasized the importance of regular monitoring of platelet counts in neonates with risk factors for thrombocytopenia, such as sepsis or preterm birth.

The management of neonatal thrombocytopenia primarily involves treating the underlying cause, such as infections, while providing supportive care. Platelet transfusions may be necessary in severe cases to prevent bleeding. The approach described by Kuruvilla et al. focuses on the early administration of antibiotics to treat infections and mitigate the risk of thrombocytopenia[23]. Our study also followed this protocol, with antibiotics being administered to neonates presenting with sepsis, leading to a resolution of thrombocytopenia in many cases.

Overall, the findings of this study align with the broader body of literature on neonatal thrombocytopenia, underscoring the multifactorial nature of this condition. Infections, prematurity, and maternal health complications remain the most common causes, and early diagnosis and intervention are critical in reducing morbidity and mortality.

Limitations of the study

One of the main limitations of our study was the relatively small sample size of 96 neonates, which may limit the generalizability of our findings to a larger population. Another limitation was the exclusion of 4 neonates due to early withdrawal from treatment, which may have affected the overall results. Furthermore, the study focused primarily on thrombocytopenia and its clinical associations without a detailed examination of other contributing factors such as genetic predispositions or maternal health conditions that could impact neonatal outcomes. Long-term follow-up of neonates with thrombocytopenia would be valuable in assessing the impact on growth, development, and neurological outcomes.

Conclusion

This study provides important insights into the clinical profile of neonatal thrombocytopenia in a tertiary care setting, highlighting the associations between platelet counts and clinical manifestations such as respiratory complications, feeding difficulties, sepsis, and C-reactive protein levels. Our results emphasize the need for vigilant monitoring of neonates with thrombocytopenia, particularly in those with higher CRP levels, as sepsis remains a major contributor to morbidity in this population. Despite the limitations, the study contributes valuable data on the prevalence and clinical presentation of thrombocytopenia in neonates, underscoring the importance of timely diagnosis and intervention.

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Conflict of Interest

The authors declare no conflict of interest.

Ethical approval

The study was approved by the Institutional Ethics Committee.

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