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ORIGINAL ARTICLE

Prevalence, risk factors, severity and outcome of neonatal thrombocytopenia.

Abdur Rehman[1], Zulfiqar Ali[2], Nazia Fatima[3], Aashee Nadeem[4]

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ABSTRACT… Objective: To find out prevalence, risk factors, severity and outcome of neonatal thrombocytopenia (TCP). **Study Design:** Prospective Observational study. **Setting:** Neonatal Intensive Care Unit (NICU) of Children Hospital Complex Multan. **Period:** January 2020 to January 2021. **Material & Methods:** A total of 191 neonates admitted to NICU during the study period were enrolled. A special proforma was designed to record all study information while SPSS version 26.0 was utilized for data analysis. Prevalence of TCP was noted among neonates admitted in NICU during the study period. Maternal risk factors, neonatal risk factors, severity of TCP and outcome were recorded. **Results:** In a total of 191 neonates, 110 (57.6%) were male while overall mean age was recorded to be 2.98+2.46 days. The prevalence of TCP was recorded to be 47.1% (90/191). Pregnancy induced hypertension (p=0.0003), premature rupture of membrane (p=0.0105) and eclampsia (0.0215) were found to have significant association with the presence of TCP. Preterm neonates (p<0.0001), small for gestational age (p<0.0001), sepsis (p<0.0001) and nectrozing enterocolitis (p=0.0014) were found to have significant association with TCP. A total of 13 (6.8%) neonates died, out of which, 5 (38.5%) were having severe TCP. **Conclusion:** Prevalence of neonatal thrombocytopenia at neonatal intensive care unit was found to be high (47.1%). Pregnancy induced hypertension, premature rupture of membrane and eclampsia were found to have significant association with neonatal thrombocytopenia. Preterm, small for gestational age, sepsis and necrotizing enterocolitis were noted to be significantly associated with neonatal thrombocytopenia. Severe thrombocytopenia was noted to be a significant predictor of poor outcomes.

Key words: Pregnancy Induced Hypertension, Premature Rupture of Membrane, Sepsis, Preterm, Thrombocytopenia.

INTRODUCTION

Thrombocytopenia (TCP) is described as platelet count below $150X10^9$/L.[1] TCP can be categorized as early onset (occurring within 72 hours following birth) or late onset (after 72 hours following birth). Prevalence of TCP among neonates is found to be between 1 to 5% but it ranges between 18 to 35% among neonates admitted to neonatal intensive care unit (NICU).[2] A recent local study noted prevalence of TCP among neonates admitted at NICU to be 41.4%.[3]

Development of TCP among neonates is complex and depends upon various maternal and fetal conditions.[4] Most commonly linked conditions with TCP are sepsis, birth asphyxia, low birth-weight (LBW), prematurity, necrotizing colitis, exchange transfusion while maternal factors include hypertension and idiopathic thrombocytopenic purpura.[5] Sepsis is found to be the commonest cause of TCP and it aggravates within 24 to 48 hours following the infective process.[6] TCP is also considered to be an important and independent risk factor for sepsis related deaths among neonates.[7]

Researchers have highlighted prevalence of severe TCP to be indirectly linked with birth weight and gestational age among neonates.[7] Chances of TCP among hospitalized neonates in NICU are highest among those who are preterm and have low-birth weight.[8] TCP is also considered to be risk factor cutaneous, pulmonary, gastrointestinal and central nervous system (CNS) bleeding. Neonates who have acidosis or hypoxia because of birth injuries are also found to develop TCP.[9]

1. MBBS, DCH, FCPS (Pediatrics), FCPS (Neonatology), Assistant Professor Neonatology, Children Hospital and Institute of Child Health, Multan.
2. MBBS, DCH, FCPS (Pediatrics), Assistant Professor and Head Haem-oncology, Children Hospital and Institute of Child Health, Multan.
3. MBBS, FCPS (Pediatrics), FCPS (Neonatology), Senior Registrar Neonatology, Children Hospital and Institute of Child Health, Multan.
4. MBBS, MCPS (Pediatrics), Admin Registrar Neonatology, Children Hospital and Institute of Child Health, Multan.

Correspondence Address:
Dr. Abdur Rehman
Al-Rahim Colony Prince Hotel Street
Nishtar Road Near Nishtar Flyover Multan.
dr.armalik@outlook.com

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Not many local studies have been conduct to explore aspects of neonates with thrombocytopenia so the present research was aimed at finding out prevalence, risk factors, severity and outcome of neonatal thrombocytopenia.

MATERIAL & METHODS

The NICU of Children Hospital Complex Multan was the venue of this prospective observational study from January 2020 to January 2021. Approval from "Institutional Ethical Committee" was acquired. Written consent was sought from parents/guardians of all study participants.

A sample size of 191 was calculated using formula: $n = z^2*p*(1 - p)/e^2$

Where: z = 1.96 for a confidence level (α) of 95%, p = prevalence of TCP in neonates admitted to ICU as 41.3%, e = margin of error as 7%.

A total of 191 neonates admitted to NICU during the study period were enrolled. Neonates having congenital or chromosomal anomalies were not included. Patients leaving against medical advice were also not enrolled. Detailed history along with physical examination was done and presenting symptoms were noted among all enrolled neonates. Presenting symptoms were noted. Maternal information like age, parity, prenatal events or illness along with mode of delivery were recorded. Relevant laboratory investigations as per institutional protocols were asked. Platelet count below 150,000/cmm was labeled as TCP. The TCP was further divided into mild (platelet count between 100,000 to 150,000 per cmm), moderate (platelet count between 50,000 to 99,000 per cmm) and severe (platelet count less than 50,000 per cmm).

A special proforma was designed to record all study information while SPSS version 26.0 was utilized for data analysis. Prevalence of TCP was noted among neonates admitted in NICU during the study period. Maternal risk factors, neonatal risk factors, severity of TCP and outcome were recorded.

RESULTS

In a total of 191 neonates, 110 (57.6%) were male while overall mean age was recorded to be 2.98+2.46 days. The prevalence of TCP was recorded to be 47.1% (90/191). Figure 1 is showing distribution of severity of TCP among neonates.

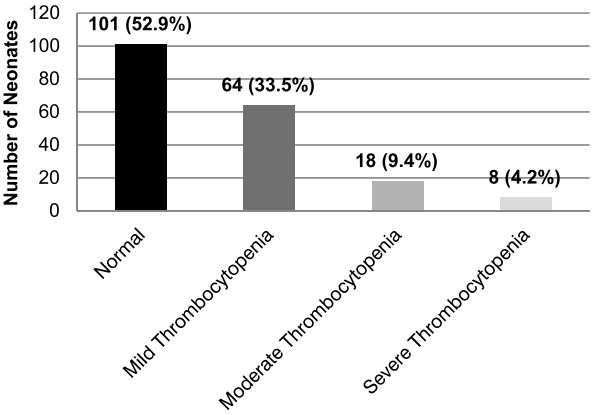

Figure-1. Neonatal thrombocytopenia and its severity among all neonates (n=191)

Table-I is showing association of maternal risk factors and TCP and it was seen that pregnancy induced hypertension (p=0.0003), premature rupture of membrane (p=0.0105) and eclampsia (0.0215) were found to have significant association with the presence of TCP.

Table-II is showing association between neonatal risk factors and thrombocytopenia and it was observed that preterm neonates (p<0.0001), small for gestational age (p<0.0001), sepsis (p<0.0001) and nectrozing enterocolitis (p=0.0014) were found to have significant association with TCP.

A total of 13 (6.8%) neonates died while remaining 178 (93.2%) were discharged successfully. The severity of TCP was found to have a significant association with mortality (p<0.0001) as shown in Table-III. Among 13 neonates who died, 5 (38.5%) were having severe TCP.

DISCUSSION

Among neonates, TCP can range between asymptomatic to severe single organ hemorrhage to disseminated intravascular coagulation.[10]

Maternal Risk Factors	Thrombocytopenia (n=90)	No Thrombocytopenia (=101)	P-Value
Pregnancy Induced Hypertension	44 (48.9%)	24 (23.8%)	0.0003
Premature rupture of membrane	16 (17.8%)	6 (5.9%)	0.0105
Eclampsia	16 (17.8%)	7 (6.9%)	0.0215
Elderly Primigravida	14 (15.5%)	19 (18.8%)	0.5524
Chronic Illness	12 (13.3%)	15 (14.9%)	0.7637
Antepartum Hemorrhage	9 (10.0%)	8 (7.9%)	0.6145

Table-I. Association between frequency of maternal risk factors and thrombocytopenia

Neonatal Risk Factors	Thrombocytopenia (n=90)	No Thrombocytopenia (=101)	P-Value
Male Gender	54 (60.0%)	56 (55.4%)	0.5249
Preterm	52 (57.8%)	28 (27.7%)	<0.0001
Small for Gestational Age	44 (48.9%)	12 (11.9%)	<0.0001
Sepsis	44 (48.9%)	13 (12.9%)	<0.0001
Birth Asphyxia	11 (12.2%)	7 (6.9%)	0.2115
Nectrozing Enterocolitis	11 (12.2%)	1 (1.0%)	0.0014
Respiratory Distress Syndrome	9 (10.0%)	6 (5.9%)	0.2979
Meconium Aspiration Syndrome	8 (8.9%)	5 (5.0%)	0.2807

Table-II. Association between neonatal risk factors and thrombocytopenia

Thrombocytopenia	Discharged (n=178)	Mortality (n=13)	P-Value
Normal (n=101)	99 (55.6%)	2 (15.3%)	<0.0001
Mild (n=64)	61 (34.3%)	3 (23.1%)	
Moderate (n=18)	15 (8.4%)	3 (23.1%)	
Severe (n=8)	2 (1.1%)	5 (38.5%)	

Table-III. Association of complications and outcome with regards to severity of thrombocytopenia (n=191)

The TCP is considered to be one of the most frequent hematological disorders observed in NICU but unless it is specifically looked at, it could be missed.[11] In the present study, prevalence of TCP was found to be 47.1% which is high when compared to a recently published local study from Islamabad when the researchers found it to be 41.4%.[3] Nandyal SS et al from India reported prevalence of TCP in NICU to be 63.8% which is highr than what we noted.[12] Ghamdi AM et al reported it to be 14%[13] while another study by Gupta A et al found it to be as high as 70.5%.[14] All these studies show variation in the prevalence of TCP among neonates admitted to NICU which could be because of diversity in admission criteria to NICUs of different parts of the world but one thing is certain that prevalence of TCP is high among neonates coming to NICUs.

In this study, 57.8% neonates with TCP were found to be preterm in comparison to 27.7% with normal platelet count ($p<0.0001$). Madavi D et al also reported significant association of prematurity with TCP and they noted 42.8% of neonates admitting to NICU with TCP to be preterm.[2] Likewise, Sharma A and Thapar K revealed 58.2% of the preterm newborns to develop TCP which is quite similar to what we noted.[15] Similar to our study, other researchers have also highlighted prematurity and neonatal sepsis to have significant association with TCP.[2]

Pregnancy induced hypertension, premature rupture of membrane as well as eclampsia were noted to be maternal factors significantly associated with neonatal TCP. Tirupathi K and colleagues also revealed premature rupture of membrane and pregnancy induced hypertension to have significant linkage with neonatal sepsis that eventually led to TCP.[16] Madavi D et al found infection during pregnancy, pregnancy induced hypertension and eclampsia to have significant association with neonatal TCP.[2]

Intraventricular hemorrhage is one of the major complications of neonatal TCP while neonates with TCP may also present with gastrointestinal bleeding, mucosal bleeding, malena or patechiae especially in the presence of severe TCP.[17,18] We noted an overall mortality rate of 6.8% in the present study while out of 13 neonates who died, 5 (38.5%) were having severe TCP. Patil S describing outcome in neonatal TCP found that 37% of the neonates who died were having severe TCP. Madavi D et al found 60% of neonates with severe TCP to die during their research.[2]

CONCLUSION

Prevalence of neonatal thrombocytopenia at neonatal intensive care unit was found to be high (47.1%). In terms of maternal risk factors, pregnancy induced hypertension, premature rupture of membrane and eclampsia were found to have significant association with neonatal thrombocytopenia. For neonatal risk factors, preterm, small for gestational age, sepsis and necrotizing enterocolitis were noted to be significantly associated with neonatal thrombocytopenia. Severe thrombocytopenia was noted to be a significant predictor of poor outcomes among sick neonates admitted to neonatal intensive care unit.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Abdur Rehman	Abstract, Introduction & Result, Discussion.	
2	Zulfiqar Ali		
3	Nazia Fatima		
4	Aashee Nadeem		