



ORIGINAL ARTICLE

Thrombocytopenia in neonatal intensive care unit at a tertiary care hospital of South Punjab, Pakistan.

Afaq Hussain¹, Muhammad Anwar², Munir Baloch³, Ali Amjad⁴, Muhammad Asghar Ali⁵

Article Citation: Hussain A, Anwar M, Baloch M, Amjad A, Ali MA. Thrombocytopenia in neonatal intensive care unit at a tertiary care hospital of South Punjab, Pakistan. Professional Med J 2023; 30(01):124-128. <https://doi.org/10.29309/TPMJ/2023.30.01.7318>

ABSTRACT... Objective: To find out fetal and maternal factors linked with thrombocytopenia (TCP) among neonates admitted in neonatal intensive care unit (NICU) of a tertiary care hospital of South Punjab, Pakistan. **Study Design:** Cross-sectional study. **Setting:** The NICU of Sadiq Abbasi Hospital, Bahawalpur. **Period:** May 2022 to August 2022. **Material & Methods:** A total of 146 neonates of both genders admitted to NICU having TCP were analyzed. Neonatal TCP was categorized as mild ($>100,000/\text{ul}$ to $<150,000/\text{ul}$), moderate ($>50,000/\text{ul}$ to $100,000/\text{ul}$) and severe ($<50,000/\text{ul}$). Associations of baseline characteristics, fetal factors and maternal factors with categories of TCP were checked applying chi-square test considering $p\text{-value} \leq 0.05$ as significant. **Results:** In a total of 147 neonates with TCP, 84 (57.5%) were male. Mean age was calculated to be 3.9 ± 3.6 days while 109 (74.7%) neonates were aged between 1 to 3 days. Distribution of TCP categories showed that 78 (53.4%) neonates were having mild TCP, 43 (29.5%) moderate TCP whereas remaining 25 (17.1%) neonates were having severe TCP. Stratification of TCP with respect study variables showed that maternal anemia ($p=0.0467$), pre-term birth (0.0001) and sepsis ($p<0.0001$) among neonates were significantly linked with severity of TCP. **Conclusion:** Most neonates admitted to NICU were having mild to moderate degree of thrombocytopenia. Severe degree of thrombocytopenia was found among neonates with history of maternal anemia, pre-term birth and sepsis.

Key words: Neonates, Neonatal Intensive Care Unit, Pre-term, Sepsis, Thrombocytopenia.

INTRODUCTION

Platelets are known to be small enucleate fragments formed by the cytoplasm of megakaryocytes. Thrombocytopenia (TCP) is described as platelet count $<150,000/\text{uL}$.¹ Around 2% of newborns are estimated to have TCP at the time of birth while 1/3rd of neonates admitted in "Neonatal Intensive Care Unit (NICU)" are calculated to have TCP at some point of time during their NICU stay.^{2,3}

Neonatal TCP is considered to be more common among extremely low birth weight (ELBW) newborns.⁴ Sepsis, birth asphyxia, prematurity, intrauterine distress, meconium aspiration syndrome (MAS) and low birth weight (LBW) are some of the most prominent risk factors for neonatal TCP.^{5,6} Some researchers have described that fetal platelet count is usually more

than $150,000/\text{ul}$ during 2nd trimester of pregnancy while it sustains to normal range in the later period whereas most cases of TCP are older pediatric age groups.⁷

Not many local studies have been done to analyze TCP among neonates admitted in NICU while one of the local studies from Islamabad analyzing neonates admitted in NICU revealed the prevalence of TCP to be 41.4%.⁸ The burden of TCP seems to be high among neonates admitted to NICU and there is a need to shed more light on fetal and maternal factors linked with TCP among neonates so the present study was planned. The aim of this study was to find out fetal and maternal factors linked with TCP among neonates admitted in NICU of a tertiary care hospital of South Punjab, Pakistan.

1. MBBS, FCPS (Pediatrics), Clinical Fellow Neonatology, Senior Registrar Neonatology, Sadiq Abbasi Hospital, Bahawalpur.
2. MBBS, DCH, FCPS (Pediatrics), FCPS (Neonatology), Associate Professor Neonatology, Quaid e Azam Medical College, Bahawalpur.
3. FCPS (Pediatrics), Clinical Fellow Neonatology, Senior Registrar Neonatology, Sadiq Abbasi Hospital, Bahawalpur.
4. FCPS (Pediatrics), Clinical Fellow Neonatology, Senior Registrar Neonatology, Children Hospital, Multan.
5. FCPS (Pediatrics), FCPS (Neonatology), Senior Registrar Neonatology, Sadiq Abbasi Hospital, Bahawalpur.

Correspondence Address:
Dr. Afaq Hussain
Department of Neonatology,
Sadiq Abbasi Hospital, Bahawalpur.
drfaqhussain@yahoo.com

Article received on: 03/10/2022
Accepted for publication: 06/12/2022

MATERIAL & METHODS

This cross-sectional study was conducted at the NICU of Sadiq Abbasi Hospital, Bahawalpur from May 2022 to August 2022. Approval from "Institutional Ethical Committee" was acquired (Ref. No. 28018, dated 03-09-2022). Informed and written consents were obtained from parents/guardians of all neonates enrolled explaining them the aims of this research. Sample size of 146 neonates was calculated considering 95% confidence level, margin of error 8% and anticipated frequency of TCP among neonates admitted to NICU as 41.4%.⁸

Inclusion criteria were neonates of both genders admitted to NICU having TCP during NICU stay. Neonates with congenital and chromosomal anomalies were excluded. Information about medical, maternal, obstetrical, birth and perinatal history were noted. Baseline investigations like complete blood count and blood culture were performed. Neonatal TCP was categorized as mild ($>100,000/\text{ul}$ to $<150,000/\text{ul}$), moderate ($>50,000/\text{ul}$ to $100,000/\text{ul}$) and severe ($<50,000/\text{ul}$).⁸ Neonates with TCP were further confirmed by performing peripheral smear study. Investigations like urine culture, chest radiographs, ultrasound cranium neurosonogram and computed tomography were performed whenever recommended advocated by the on-duty senior neonatologist consultants. All investigations were performed adopting standard protocols. All study data was noted on a predesigned format prepared specifically for this study.

For data analysis, "Statistical Package for Social Sciences (SPSS)" version 26.0 was used. Numeric data were highlighted as mean and standard deviation (SD). Categorical variables were represented as number and percentages. Association of baseline characteristics, fetal factors and maternal factors with categories of TCP were checked applying chi-square test. P-value ≤ 0.05 was taken as significant.

RESULTS

In a total of 146 neonates with TCP, 84 (57.5%) were male. Mean age was calculated to be 3.9 ± 3.6 days while 109 (74.7%) neonates were

aged between 1 to 3 days. Area of residence was rural among 79 (54.1%) neonates. Table-I is showing demographical characteristics of neonates studied.

Demographical Characteristics		Number (%)
Gender	Male	84 (57.5%)
	Female	62 (42.5%)
Age (days)	1-3	109 (74.7%)
	4-7	26 (17.8%)
	>7	11 (7.5%)
Residence	Rural	79 (54.1%)
	Urban	67 (45.9%)

Table-I. Demographical characteristics of neonates (n=146)

Anemia was the most commonly reported maternal risk factors, noted in 62 (42.4%) subjects while premature rupture of membrane was noted in 42 (28.8%). In terms of fetal risk factors, sepsis was observed in 59 (40.4%) whereas 51 (34.9%) neonates were pre-term as shown in Table-II.

Frequency of Risk Factors		Number (%)
Maternal Risk Factors	Pregnancy Induced Hypertension	24 (16.4%)
	Eclampsia	4 (2.7%)
	Premature Rupture of Membrane	42 (28.8%)
	Anemia	62 (42.4%)
Fetal Risk Factors	Pre-Term	51 (34.9%)
	Birth Asphyxia	14 (9.6%)
	Sepsis	59 (40.4%)
	Respiratory Distress Syndrome	16 (11.0%)
	Neonatal Jaundice	12 (8.2%)
	Meconium Aspiration Syndrome	15 (10.3%)
	Necrotizing Enterocolitis	6 (4.1%)

Table-II. Frequency of maternal and fetal risk factors (n=146)

Distribution of TCP categories showed that 78 (53.4%) neonates were having mild TCP, 43 (29.5%) moderate TCP whereas remaining 25 (17.1%) neonates were having severe TCP. Stratification of TCP with respect study variables is shown in Table-III. It was noted that maternal anemia ($p=0.0467$), pre-term birth (0.0001) and sepsis ($p<0.0001$) among neonates were significantly linked with severity of TCP.

Study Variables		Thrombocytopenia			P-Value
		Mild (n=78)	Moderate (n=43)	Severe (n=25)	
Gender	Male	46 (59.0%)	24 (55.8%)	14 (56.0%)	0.9313
	Female	32 (41.0%)	19 (44.2%)	11 (44.0%)	
Age (days)	1-3	63 (80.8%)	31 (72.1%)	15 (60.0%)	0.3838
	4-7	11 (14.1%)	8 (18.6%)	7 (28.0%)	
	>7	4 (5.1%)	4 (9.3%)	3 (12.0%)	
Residence	Rural	43 (55.1%)	25 (58.1%)	11 (44.0%)	0.5110
	Urban	35 (44.8%)	18(41.9%)	14 (56.0%)	
Pregnancy Induced Hypertension		9 (11.5%)	7 (16.3%)	8 (32.0%)	0.0558
Eclampsia		1 (1.3%)	1 (2.3%)	2 (8.0%)	0.1973
Premature Rupture of Membrane		21 (26.9%)	12 (27.9%)	9 (36.0%)	0.6760
Anemia		28 (35.9%)	18 (41.9%)	16 (64.0%)	0.0467
Pre-Term		13 (16.7%)	24 (55.8%)	14 (56.0%)	0.0001
Birth Asphyxia		4 (5.1%)	6 (13.9%)	4 (16.0%)	0.1408
Sepsis		18 (23.1%)	22 (51.1%)	19 (76.0%)	<0.0001
Respiratory Distress Syndrome		8 (10.3%)	5 (11.6%)	3 (12.0%)	0.9575
Neonatal Jaundice		5 (6.4%)	5 (11.6%)	2 (8.0%)	0.5255
Meconium Aspiration Syndrome		6 (7.7%)	4 (9.3%)	5 (20.0%)	0.2046
Necrotizing Enterocolitis		3 (3.8%)	1 (2.3%)	2 (8.0%)	0.5165

Table-III. Stratification of thrombocytopenia with respect to demographical characteristics, maternal and fetal risk factors (n=146)

DISCUSSION

We reported 57.5% of neonates with TCP to be males which is consistent with the findings reported in the literature. It was also evident in this study that majority of the neonates, 74.7% neonates were having early onset TCP. Eslami Z et al⁹ as well as Ghamdi AM et al¹⁰ found early onset TCP to be present among majority of the neonatal TCP cases. Literature reports consensus regarding this fact that majority of the neonates with TCP are being reported in first 3 days of life.¹¹

We noted that 17.1% neonates admitted to NICU had severe TCP. The present study highlights that most of the neonatal TCP cases accompany mild to moderate TCP. The literature reports similar findings where majority of neonatal TCP cases admitted to NICU have mild to moderate degree TCP which usually resolves when the underlying illness is addressed and managed.^{10,11} A local study done by Noreen N et al revealed that among 55 neonates with TCP admitted to NICU, 30.9% had severe TCP which is more than what we reported in this research.⁸ Regional data from India found 46% of neonates with TCP in NICU to have mild TCP while 35% had moderate TCP while 19% were having severe TCP.¹² These

findings from India are relatively similar to what has been shown in this research. Khalessi N and colleagues as well as Ghamdi AM et al also reported somewhat similar distribution of TCP among neonates in NICU.^{10,11} High proportion of moderate to severe TCP in NICU might be reflecting high magnitude of sepsis cases.¹³

Maternal anemia (42.4%) and premature rupture of membrane were the most common maternal risk factors reported in our study. Meena SL et al observed anemia (48.0%) to be the most common maternal risk factors among neonates having TCP in NICU.¹² We also found maternal anemia to have significant association with increased severity of TCP. Tirupath K et al revealed TCP to be significantly linked with maternal anemia among neonates in NICU.¹⁴ We also found sepsis to be significantly linked with increased severity of TCP among neonates. Researches done by Basil M et al as well as Gupta A et al have shown similar results where sepsis is considered to be the most important fetal risk factor among neonates having TCP.^{2,15} As we know, sepsis might be leading to TCP because of relatively lower production of platelets and higher rates of destruction; these could be the reasons behind this exaggerated

proportion of sepsis and its linkage with TCP in this study.¹² Some others have shown sepsis as well as birth asphyxia to have significant linkage with neonatal TCP but we did not find any significant connection of birth asphyxia with TCP in this study.^{2,5}

This study had some limitations as well. Being a cross-sectional study, we were unable to record outcomes among neonates with different categories of TCP. Small sample size and a single NICU being the venue of this study, our findings need to be further verified in the future studies.

CONCLUSION





Most neonates admitted to NICU were having mild to moderate degree of thrombocytopenia. Severe degree of thrombocytopenia was found among neonates with history of maternal anemia, pre-term birth and sepsis.

Copyright© 06 Dec, 2022.

REFERENCES

- Resch E, Hinkas O, Urlesberger B, Resch B. **Neonatal thrombocytopenia-causes and outcomes following platelet transfusions.** Eur J Pediatr. 2018; 177(7):1045-1052. doi:10.1007/s00431-018-3153-7
- Gupta A, Mathai SS, Kanitkar M. **Incidence of thrombocytopenia in the neonatal intensive care unit.** Armed Forces Med J India 2011; 67:234-6.
- Roberts I, Murray NA. **Neonatal thrombocytopenia: Causes and management.** Arch Dis Childhood-Fetal Neonatal Ed. 2003; 88(5):F359-64.
- Christensen RD, Henry E, Wiedmeier SE, Stoddard RA, Sola-Visner MC, Lambert DK, Kiehn TI, Ainsworth S. **Thrombocytopenia among extremely low birth weight neonates: Data from a multihospital healthcare system.** J Perinatol. 2006 Jun; 26(6):348-53.
- Sonam S, Nandyal, Shashikala P, Vidhushi Sahgal. **Study of thrombocytopenia in neonatal intensive care unit.** Ind J Pathology Oncol. 2016; 3(1); 55-9.
- Abebe Gebreselassie H, Getachew H, Tadesse A, Mammo TN, Kiflu W, Temesgen F, et al. **Incidence and risk factors of thrombocytopenia in neonates admitted with surgical disorders to neonatal intensive care unit of Tikur Anbessa specialized hospital: A one-year observational prospective cohort study from a low-income country.** J Blood Med. 2021; 12:691-7.
- Roberts I, Murray NA. **Neonatal thrombocytopenia: New insights into pathogenesis and implications for clinical management.** Current Opinion Pediatr. 2001; 13(1):16-21.
- Noreen N, Amanat ST, Ali S. **Thrombocytopenia in neonatal intensive care unit and role of platelet transfusion.** J Rawalpindi Med Coll; 2019; 23(2):68-71.
- Eslami Z, Lookzadeh MH, Noorishadkam M, Hashemi A, Ghilian R, Dehghan PA. **Thrombocytopenia and associated factors in neonates admitted to NICU during years 2010-2011.** Iran J Ped Hematol Oncol. 2013; 3(1); 205-15.
- Ghamdi AM, Umran KA, Buali WA. **A practical approach to assessment of neonatal thrombocytopenia in NICU.** J Neonatal-Perinatal Med. 2008; 1(3):175-80.
- Khalessi N, Khosravi N, Sanni S. **The prevalence and risk factors for neonatal thrombocytopenia among newborns admitted to intensive care unit of aliasghar children's hospital.** Iran J Blood Cancer. 2013; 5(2):41-5.
- Meena SL, Singh K, Jain S, Jain A, Karnawat BS. **Clinical profile and outcome of neonatal thrombocytopenia in a tertiary care hospital.** Int J Contemp Pediatr 2019; 6:1344-8.
- Levit O, Bhandari V, Li FY, Shabanova V. **Clinical and laboratory factors that predict death in very low birth weight infants presenting with late-onset sepsis.** Pediatr Infect Dis J. 2014; 33(2):143-46.
- Tirupathi K, Swarnkar K, Vagha J. **Study of risk factors of neonatal thrombocytopenia.** Int J Contemp Pediatr. 2017; 4:191-6.
- Basil M. Hanoudi CABP. **Study of risk factors for neonatal thrombocytopenia in preterm infants.** Mustansiriya Med J. 2015; 14(1):64-9.

AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Afaq Hussain	Data collection, Drafting.	
2	Muhammad Anwar	Methodology, Discussion.	
3	Munir Baloch	Study concept, Data Analysis, Proof reading.	
4	Ali Amjad	Data collection, Literature review.	
5	Muhammad Asghar Ali	Data collection, Literature review.	