Thrombocytopenia burden and its associating Risk factors: A cross-sectional study at a tertiary care set up

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Abstract—*Thrombocytopenia is a very common finding in the neonatal intensive care unit. This study was designed with aim to study the risk factors associated with neonatal thrombocytopenia. In this cross-sectional observational study, 263 newborns admitted in the NICU from October 2016 to December 2016 were enrolled in the study. Proportion of thrombocytopenia was found along with its various neonatal and maternal risk factors associated. Chi-square test was used to find out association. Neonatal thrombocytopenia was found in 29% of neonates; 64 % had early onset and 36 % had late onset thrombocytopenia. Mild, moderate and severe thrombocytopenia was found in 49 %, 34 % and 17 % respectively. Thrombocytopenia was found to be associated with APH and PROM among maternal factors and with LBW, prematurity and birth asphyxia among neonatal factors.*

Keywords: Thrombocytopenia, Neonatal Intensive Care Unit (NICU), Asphyxia.

I. INTRODUCTION

Thrombocytopenia is one of the common hematological problems in a neonatal intensive care unit particularly in premature and sick newborns.[1] Incidence varies greatly generally it accounts forupto20 to 40 per cent of the newborn admissions to NICU.[2,3,4,5,6]

Thrombocytopenia is defined as a platelet count of less than 1,50,000 per cmm regardless of the gestational age.[7] Based on the time of onset, thrombocytopenia further classified as early onset that is within first 72 hours of birth and late onset that is after 72 hours of life.[8] Grading of thrombocytopenia further done into mild, moderate and severe based on platelet count. Mild thrombocytopenia is defined as a platelet count of 1,00,000 to 1,50,000 per cmm, moderate as count between 50,000 to less than 1,00,000 per cmm and severe as count less than 50,000 per cmm. Multiple neonatal and maternalfactors can cause thrombocytopenia in the neonates admitted in NICU.[9,10,11] The common neonatal factors being pre-maturity, IUGR/LBW, sepsis and asphyxia.[12,13,14] Maternal factors generally associated are APH, PROM, Pre-eclampsia and eclampsia and other chronic illnesses.[12,13,14]

Thrombocytopenia is a significant cause of morbidity and mortality in the NICU and if not managed appropriately it can result in severe consequences like pulmonary and intracranial hemorrhage.

This present study was undertaken to found various neonatal and maternal risk factors associated with thrombocytopenia in the neonates admitted in NICU.

II. METHODOLOGY

This cross-sectional analytic study was conducted in the Neonatal Intensive Care Unit (NICU) of Mahila Chikitsalaya attached to SMS Medical College, Jaipur, Rajasthan. It was carried out on 263 neonates admitted in the NICU from 1st October 2016 to 31st December 2016. Babies were excluded if they died or were discharged before 72 hours of admission. Informed consents were obtained from mothers of newborns included in the study.

Platelet count was carried out on the first, third and fifth days after admission to NICU. In neonates having low platelet count further counts were done every 24 to 48 hrs depending on the patient's clinical condition. Platelet counting was performed on ethylenediaminetetra acetate anti-coagulated blood with a standard automatic blood cell counter as part of complete blood count (CBC). Early thrombocytopenia was taken as onset within first 72 hours of birth and late thrombocytopenia as onset after first 72 hours of life. Mild, moderate and severe thrombocytopenia were taken as a platelet count respectively of 1,00,000 to 1,50,000 per cmm, 50,000 to 1,00,000 percmm and less than 50,000 per cmm. After taking general information some maternal and neonatal information were also collected. Maternal information included the antenatal history with presence/absence of risk factors like PROM, APH, PIH, eclampsia, gestational diabetes, any chronic illness, any drug history and mode of delivery. Neonatal information was taken about sex of newborn, gestational age, APGAR score at birth, birth weight, IUGR, asphyxia, sepsis, requirement of surfactant and ventilator on admission and final fate in the NICU whether survived or died.

Statistical analysis: Quantitative data were expressed in mean SD and qualitative data were expressed in proportions. Associations were determined by Chi-square test in qualitative variables and unpaired 't' test in quantitative variables with the help of Statistical software Primer version 6.

III. RESULTS

Total 263 newborns were admitted in the NICU of Mahila Chikitsalaya, SMS Medical College, Jaipur (Rajasthan) over a period from 1st October 2016 to 31st December 2016. Out of these 263 admitted newborns, 165 (62.73%) were males and 96 (36.5%) were females and 2 (0.76 %) had ambiguous genitalia. As per the mode of delivery, 156 (59.31%) were born by normal vaginal delivery and 107 (40.68%) were born by LSCS. Out of total newborns, 21.67% (57/263) were small for gestational age and 78.32 % (206/263) were appropriate for gestational age. Regarding maturity, 39.54% (104/263) were term babies and 60.45% (159/263) were preterm.

Out of total newborns, 64% had early onset and 36% had late onset thrombocytopenia. Out of these thrombocytopenic newborns 49% had mild, 34% had moderate and 17% had severe thrombocytopenia. (Figure 1&2)

The overall proportion of thrombocytopenia in the study group was 29% (76/263). Females predominates over males i.e. 33.33% (32/96) v/s 26.66 %(44/165). As for the mode of delivery, incidence of thrombocytopenia in normal vaginal delivery was 59.31% (52/156) and in LSCS was 40.68% (24/107). Incidence of thrombocytopenia in term newborns was 21.15% (22/104) and in

preterm was 33.96% (54/159).

Among mothers of these 263 newborns, 53 (20.15%) had pre rupture of membrane (PROM), 47 (17.87%) had ante partum hemorrhage (APH), 13 (4.94%) had PIH, 3 (1.14%) had eclampsia, 9 (5.42%) had Chronic illness including 2 ANCs with diabetes. (Figure 3)

Out of total 263 newborns, 179(68.06%) were low birth weight (LBW), 159 (60.46%) were preterm, 57 (21.67%) were small for date (SGA), 81 (68.82%) were with poor APGAR score, 26 (9.89%) were CRP positive and 34 (12.93%) were blood culture positive. Out of these newborn, 77 (29.28%) required ventilator, 34 (12.93%) required surfactant. Out of these 263 newborn, 54(20.53%) had seizures. (Figure 4)

Figure 1

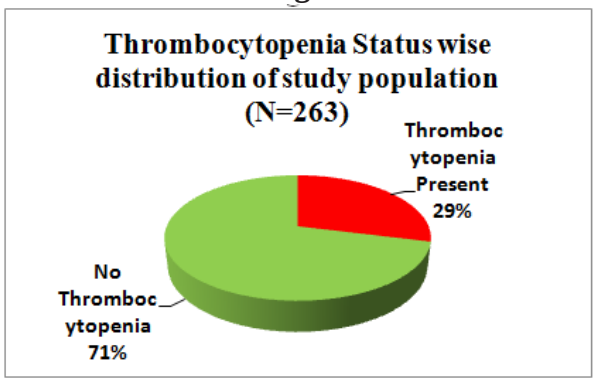


Figure 2

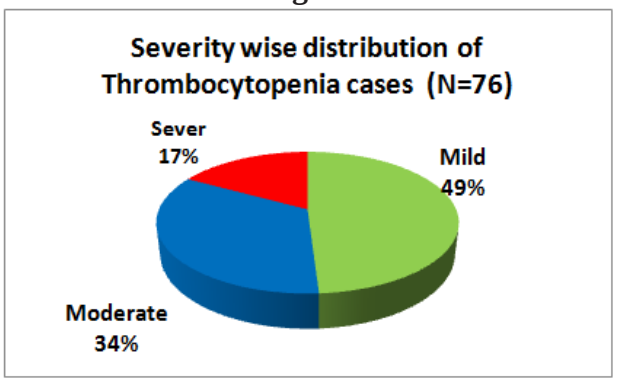


Figure 3

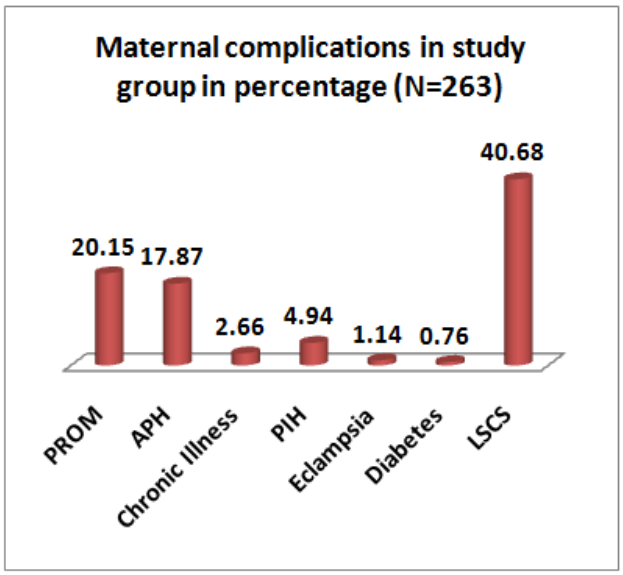
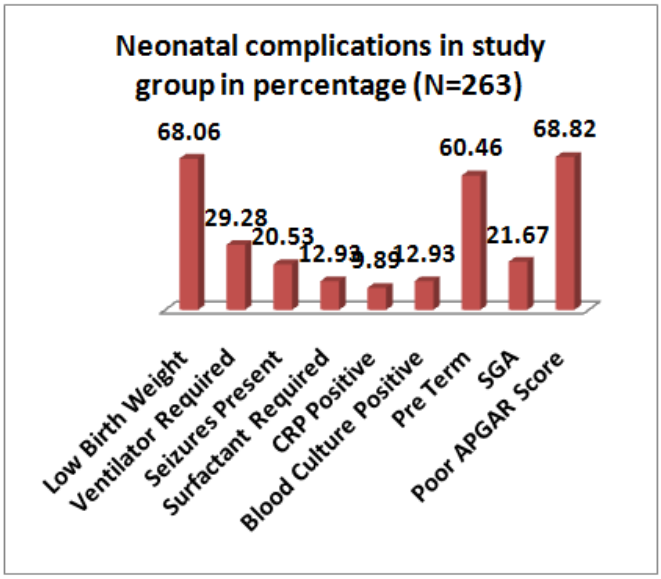


Figure 4



When association of maternal factors with thrombocytopenia were analysed, it was found that although proportion of mothers with PROM, APH, PIH, Eclampsia and other chronic illness were higher in mothers of thrombocytopenic newborn than mothers of newborn without thrombocytopenia but proportion of APH & Eclampsia were found significantly higher. (Table 1)

Table 1
Association of Maternal Factors with Thrombocytopenia in Neonates

MATERNAL FACTORS	Total		Newborn without Thrombocytopenia (N=187)		Newborn with Thrombocytopenia (N=76)		'p' value*
	No.	%	No.	%	No.	%	
PROM	53	20.15	33	17.65	20	26.32	0.156
APH	47	17.87	25	13.37	22	28.95	**0.005**
PIH	13	4.94	8	4.28	5	6.58	0.641
Eclampsia	3	1.14		0	3	3.95	**0.036**
Chronic Illness	7	2.66	3	1.6	4	5.26	0.212
Diabetes	2	0.76	2	1.07	0	0	0.903
LSCS	107	40.68	83	44.39	24	31.58	0.075

Chi-Square Test

Out of total 263 newborn, 76 (29%) had thrombocytopenia in the study group. although females predominates over males i.e. 33.33% (32/96) v/s 26.66%(44/165) in having thrombocytopenia but this variation in proportion was not found significant. (Table 2)

Table 2
Association of sex of newborn with Thrombocytopenia

Sex of Newborn	Total		Newborn without Thrombocytopenia (N=187)		Newborn with Thrombocytopenia (N=76)		'p' value*
	No.	%	No.	%	No.	%	
Male	165	62.74	121	64.71	44	57.89	0.344
Female	96	36.5	64	34.22	32	42.11	
Ambiguous	2	0.76	2	1.07	0	0	

Chi-Square Test

When association of neonatal factors with thrombocytopenia were analysed, it was found that although proportion of newborn who were LBW, preterm, with blood culture positive were higher in thrombocytopenic newborn than newborn without thrombocytopenia but it was found significant in newborn who were preterm. (Table 3)

Table 3
Association of Neonatal Factors with Thrombocytopenia in Neonates

NEONATAL FACTORS	Total (N=263)		Newborn without Thrombocytopenia (N=187)		Newborn with Thrombocytopenia (N=76)		'p' value*
	No.	%	No.	%	No.	%	
Low Birth Weight	179	68.06	121	64.71	58	76.32	0.092
Seizures Present	54	20.53	42	22.46	12	15.79	0.296
CRP Positive	26	9.89	21	11.23	5	6.58	0.359
Blood Culture Positive	34	12.93	24	12.83	10	13.16	0.895
Pre Term	159	60.46	105	56.15	54	71.05	**0.036**
SGA	57	21.67	35	18.72	22	28.95	0.097
Poor APGAR Score	181	68.82	130	69.52	51	67.11	0.813

Chi-Square Test

When prognosis of newborn with thrombocytopenia were compared with newborn without

thrombocytopenia, it was found that although proportion of newborn who required ventilator or surfactant were higher in thrombocytopenic newborn than newborn without thrombocytopenia but it was found significant in newborn who required ventilator. (Table 4)

When outcome of newborn with thrombocytopenia were compared with newborn without thrombocytopenia, it was found that outcome was significantly different in both the groups. Mortality was found more in newborn with thrombocytopenia thrombocytopenic newborn than newborn without thrombocytopenia. But it was found significant in newborn that required ventilator. (Table 4)

Table 4
Comparison of prognosis and outcomes in newborn with and without Thrombocytopenia

Prognosis and Outcome		Total		Newborn without Thrombocytopenia (N=187)		Newborn with Thrombocytopenia (N=76)		'p' value*
		No.	%	No.	%	No.	%	
Requirement	Ventilator Required	77	29.28	46	24.6	31	40.79	**0.014**
	Surfactant Required	34	12.93	20	10.7	14	18.42	0.136
Outcome	Discharged	185	70.34	143	76.47	42	55.26	**0.001**
	Death	67	25.48	39	20.86	28	36.84	
	Transferred	2	0.76	2	1.07	0	0	
	LAMA	9	3.42	3	1.6	6	7.89	

Chi-Square Test

IV. DISCUSSION

In the present study, Thrombocytopenia is frequently encountered in the NICU and is a significant cause of neonatal morbidity and mortality.

In this study the proportion of thrombocytopenia in the neonates admitted in the NICU was found 29%. Several studies have reported thrombocytopenia ranging from 22% to 35 % in all infants admitted to the neonatal intensive care unit.[14,15] Similar in study conducted byEslami and co-workers it was found 28.5%.[16] A study conducted by Henry E and co-workers found 22% of neonates thrombocytopenic.[17]

In this study 64% of neonates had early onset and 36% had late onset thrombocytopenia. Eslami et al[16] found 75.3% of neonates had early onset and 24.7% had late onset thrombocytopenia. Study by Jeremiah Z etal showed early onset thrombocytopenia in 84.4% and late onset in 15.6% of newborns.[18]

Present study found that 49% neonates had mild thrombocytopenia, 34% had moderate and 17% had severe thrombocytopenia. Almost similar observations were made by Henry E which showed 42% of neonates with mild, 38% moderate and 20% with severe thrombocytopenia respectively.[17] Several authors found mild to moderate thrombocytopenia in 80 % cases.[15,19] Study conducted by Hashemi reported 49.4% neonates with mild, 47.1% moderate and 3.5% severe thrombocytopenia.[16]

However similar to other studies, this study did not find any association of thrombocytopenia with sex and mode of delivery. [20-23]

Proportion of thrombocytopenia was found higher in preterm neonates as compared to term newborns in the present study. Well comparable observations were made by Hashemi A etall[16] and Bonifacio et al.[21]

In this study the maternal factors associated with thrombocytopenia were ante-partum hemorrhage (APH) and premature rupture of membranes (PROM). This is in contrast to the observations made by Hashemi et al where the most common maternal factors were hypertension and diabetes.[16]

The common neonatal factors associated with thrombocytopenia in this study were LBW, prematurity and asphyxia. This is almost similar to findings of Eslami Z who reported common neonatal factor associated with low platelet count as asphyxia, sepsis and IUGR.[16] A study conducted by Gupta et al[24] found that thrombocytopenia occurred more frequently in association with sepsis, LBW, severe birth asphyxia, babies born to pre-eclampctic mothers and low birth weight babies.

In this study mortality was found more in neonates with thrombocytopenia than without thrombocytopenia, which may be explain that thrombocytopenia may contribute in NICU mortality.

V. CONCLUSION

This study concludes that Neonatal thrombocytopenia was found in more than one in four neonates in NICU. is a very common problem in the NICU. Thrombocytopenia was found to be associated with APH and PROM among maternal factors and with LBW, prematurity and birth asphyxia among neonatal factors. By treating the various maternal and neonatal factors associated with thrombocytopenia it can reduce neonatal morbidity and mortality.

CONFLICT OF INTEREST

None declared till now.

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