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Original Article

Association of Various Factors with Thrombocytopenia in Neonates, Secondary to Maternal Pregnancy-Induced Hypertension

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ABSTRACT

Objective: To assess the presence of Thrombocytopenia among the neonates born to mothers having pregnancy-induced hypertension and associated socio-demographic factors.

Study Design: Cross-sectional study.

Place and Duration of Study: Pak Emirates Military Hospital, Rawalpindi Pakistan, from Apr to Jun 2021.

Methodology: This study was conducted on neonates who were born to mothers who were diagnosed and managed with pregnancy-induced hypertension. Thrombocytopenia was defined as a platelet count of <150,000/µl and was performed after 24 hours of birth till seven days of age. Gender of the neonate, Birth weight, gestational age and mode of delivery were the factors studied with Thrombocytopenia in the study population.

Results: A total of 300 neonates born to mothers with pregnancy-induced hypertension were included in the study. The mean age of the mothers included in the study was 34.16±2.443 years, while the mean age of the neonates was 3.66±2.33 years. Of them, 90(30%) had the presence of Thrombocytopenia, while 210(70%) had a normal platelet count. 160(53.3%) were male neonates, while 140(46.7%) were female. Low birth weight of neonates and gestational age <37 weeks had a statistically significant relationship (p-value<0.05) with the presence of Thrombocytopenia in neonates born to mothers with pregnancy-induced hypertension.

Conclusion Thrombocytopenia was a common finding among neonates born to mothers who suffered from pregnancy-induced hypertension. Neonates born at less than 37 weeks and those with low birth weight were more at risk of developing Thrombocytopenia as compared to neonates who were born at term with normal weight.

Keywords: Infant, Newborn, Hypertension, Pregnancy-Induced, Blood platelets, Platelet count, Infant, Low birth weight, Infant, Very low birth weight, Pregnancy

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INTRODUCTION

Pregnancy-induced hypertension is one of these conditions, which, if not detected in time and left untreated, may lead to serious consequences.[1] Even patients who are diagnosed in time and managed effectively may be at risk of having both maternal and fetal complications as compared to those who have not been suffering from this condition.[2,3] Normal blood indices are important in maintaining the overall well-being of individuals, especially tender groups of populations like neonates.[4] The Importance of platelets cannot be undermined, and their appropriate qualitative and quantitative functioning is necessary to maintain hemostasis in newborns.[5] Multiple medical conditions in the mother and baby may cause the babies to develop Thrombocytopenia soon after birth.[6,7]

Booked pregnancies usually get adequate antenatal care, and pregnancy-induced medical conditions may be diagnosed and managed early.[8,9] A recent study published in the Pakistan Armed Forces Medical Journal highlighted maternal and perinatal outcomes in pregnancy-induced hypertensive mothers in Pakistan. They concluded that multiple maternal and neonatal complications might occur in these cases, and treating obstetricians should be aware of these complications to detect and prevent them.[10] Limited local data is available regarding the impact of maternal hypertension during pregnancy on haematological indices. This study was planned to determine the presence of Thrombocytopenia among neonates born to mothers having pregnancy-induced hypertension and associated socio-demographic factors.

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METHODOLOGY

The cross-sectional study was conducted at the Paediatric Department of Pak Emirates Military Hospital, Rawalpindi Pakistan, from April to June 2021, after approval from the Ethical Review Board Committee. WHO Sample Size Calculator calculated sample size using the population proportion of hyperztensive disorder of pregnancy as 6.82%.[11] A non-probability consecutive sampling technique was used to gather the sample.

Inclusion Criteria: All neonates (1-7 days of age) born to mothers (19-45 years of age) who were diagnosed and managed for pregnancy-induced hypertension in the Obstetric Unit were included.

Exclusion Criteria: Neonates with haemorrhage at the time of birth or any diagnosable haematological or vascular disorder, neonates born to mothers with gestational diabetes, autoimmune disorders pr, pre-eclampsia or eclampsia were excluded. The analysis did not include Women taking any medications that could interfere with platelet count.

Written informed consent from the care-giver of neonates were taken. Consultant obstetrician diagnosed pregnancy-induced hypertension in light of recent criteria.[12] Mothers were contacted and informed about the study before the birth of their babies. Blood was withdrawn from neonates when brought for the first vaccination dose at the paediatrics department. A blood sample was sent to the hospital laboratory, and a platelet count was calculated. Thrombocytopenia was defined as a platelet count of <150,000/µl.[13] Gender of the neonate, Birth weight, gestational age and mode of delivery were the factors studied with Thrombocytopenia in the study population.

Statistical Package for Social Sciences (SPSS) version 25.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Chi-square test was applied to explore the inferential statistics. The *p*-value of ≤0.05 was set as the cut-off value for significance.

RESULTS

A total of 300 neonates born to mothers with pregnancy-induced hypertension were included in the study. The mean age of the mothers included in the study was 34.16±2.443 years, while the mean age of the neonates was 3.66±2.33 years. Table-I shows the general characteristics of the study population. Of them, 90(30%) had the presence of Thrombocytopenia, while 210(70%) had a normal platelet count. 160(53.3%) were male neonates, while 140(46.7%) were female. Two hundred and fifty (83.3%) had normal birth weight, while 50(16.7%) had either low or extremely low birth weight. Table-II reveals that low birth weight of neonates (*p*-value<0.001) and gestational age <37 weeks (*p*-value-0.007) had a statistically significant relationship with the presence of Thrombocytopenia in neonates born to mothers with pregnancy-induced hypertension while the gender of the neonate (*p*-value-0.614) and mode of delivery (*p*-value-0.910) had no such relationship.

Table-I: Characteristics of Study Participants (n=300)

Study Parameters	n(%)
Age of Mothers (years)	
Mean+SD	34.16±2.443 years
Range (min-max)	19 years±45 years
Age of Neonates (days)	
Mean+SD	3.66±2.33 years
Range (min-max)	1 day±7 days
Gender	
Male	160(53.3%)
Female	140(46.7%)
Presence of Thrombocytopenia	
No	210(70%)
Yes	90(30%)
Birthweight	
Normal	250(83.3%)
Low or extremely low	50(16.7%)

Table-II: Relationship of Various Variables with Presence of Thrombocytopenia Among the Neonates (n=300)

Factors studied	Normal Platelet Count	Thrombo cytopenia	*p*-value
Gender of Neonate			
Male	114(54.3%)	46(51.1%)	0.614
female	96(45.7%)	44(49.9%)	
Birth Weight			
Normal	190(90.5%)	60(66.7%)	<0.001
Low or extremely low	20(9.5%)	30(33.3%)	
Gestational Age			
>37 weeks	16(76.7%)	55(61.1%)	0.007
<37 weeks	49(23.3%)	35(38.9%)	
Mode of Delivery Vaginal			
Delivery	15(72.8%)	65(72.2%)	0.910
Cesarean Section	57(27.2%)	25(27.8%)	

DISCUSSION

Pregnancy predisposes women to several other health-related conditions which may affect the foetus inside the uterus or may lead to unfavourable outcomes, even in newborn babies. PIH is one of those conditions which have been studied to cause both

maternal and fetal complications.[14] Thrombocytopenia could be a serious consequence of PIH and can lead to life-threatening complications if not managed in time. Limited local data establishing the association of neonatal Thrombocytopenia and maternal PIH has been available. This study would establish the presence of Thrombocytopenia among neonates born to mothers having pregnancy-induced hypertension and associated socio-demographic factors and help clinicians pick high-risk cases in time.

Agarwal *et al*.[15] studied changes in the coagulation profile of newborns secondary to pregnancy-induced hypertension in mothers. They concluded that Prothrombin Time, Partial Thromboplastin Time with Kaolin, Thrombin Time, and Fibrinogen Degradation Products were significantly raised. Fibrinogen and Platelet counts were reduced in neonates born to mothers with PIH, and the severity of PIH predicted the severity of these abnormalities as well. We did not study other parameters, but the platelet count was reduced in almost 30% of our study participants, highlighting the magnitude of this problem. Bhat *et al*.[16] came up with the findings that around 36% of the neonates born to mothers with PIH had Thrombocytopenia. Male gender, low birth weight and pre-term birth were the risk factors associated with Thrombocytopenia in their study. Our results supported their finding that low birth weight and the birth of neonates before 37 weeks of gestation were statistically significantly related to Thrombocytopenia in our study participants. Though done in different countries, both these studies represent similar populations of the Indo-Pak subcontinent; therefore, their findings could be used as a baseline for larger studies.

A case-control study was performed in Qatar by Bayoumi *et al*.[17] revealing that 13% of babies born to women with pre-eclampsia developed neonatal Thrombocytopenia, which was significantly higher as compared to only 2% in the control group. Our sample population revealed a higher percentage of neonates born to mothers with PIH having Thrombocytopenia. The reason may be linked to the sample population as we did not include patients with pre-eclampsia; the study design was cross-sectional or may be better control of PIH. Mouna *et al*. chose a rural hospital in India to determine the haematological parameters in neonates born to preeclamptic mothers. They concluded that almost all the blood indices were significantly deranged among babies born to preeclamptic mothers as compared to babies born to mothers with uneventful pregnancies.[18] We chose mothers with PIH only, and mothers having pre-eclampsia or eclampsia were part of our exclusion criteria. However, these disorders lie in the same spectrum to compare the results.

LIMITATION OF STUDY

Only those neonates brought by their mothers for blood testing were included. This may cause bias in the data as if all those neonates who were born to mothers with PIH but not tested had changed the results. It is very difficult to screen neonates for any innate haematological abnormality within the first week of birth, so there may be cases in which Thrombocytopenia is related to some neonatal abnormality and not to the mother's PIH.

CONCLUSION

Thrombocytopenia was a common finding among neonates born to mothers who suffered from pregnancy-induced hypertension. Neonates born at less than 37 weeks and those with low birth weight were more at risk of developing Thrombocytopenia as compared to neonates who were born at term with normal weight.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

NN & ST: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

MT & SN: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

AR & RN: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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