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Assessment of Hematological Profile and Morbidity of Newborns At Birth, Born To Mothers With Gestational Hypertension, Pre-Eclampsia and Eclampsia Syndrome

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Abstract

Background: Hypertensive disorders of pregnancy complicate about 8% of all gestation. Hypertensive disorders are responsible for significant maternal and perinatal morbidity and mortality. This study aims to determine the hematological parameters and morbidity in neonates born to mothers with gestational hypertension, pre-eclampsia or eclampsia syndrome and in neonates born to normotensive mothers without any maternal complications or medical illness with special reference to platelet count and neutrophil count.Methods: A prospective study conducted on 50 neonates born to pregnant women complicated with gestational hypertension, pre-eclampsia or eclampsia and 50 neonates born to normotensive mothers recruited at Neonatal Intensive Care Unit and Post natal wards who were delivered between November 2013 to October 2014 and the hematological parameters of these babies were studied.Results: In our study we observed that the mean value of platelet count were significantly lower in study group compared to control group which was highly statistical significant. The mean value of PT, aPTT, BT and CT were significantly higher in study group, as compared to control group.Conclusion: To conclude early hematological screening of babies born to mothers with PIH are recommended to facilitate early detection and management of serious neonatal complications to decrease morbidity, improved growth, development and survival

Key words: Pre-eclampsia, Eclampsia, Gestational Hypertension, Newborns

INTRODUCTION

Hypertensive disorders of pregnancy complicate about 8% of all gestations.[1] Hypertensive disorders are responsible for significant maternal and perinatal morbidity and mortality. Intracranial hemorrhage is the commonest cause of death associated with hypertension.[2] Fetal growth restriction and pregnancy-induced hypertension (PIH) complicate a significant proportion of all pregnancies and predict later cardiovascular disease.[3] Earlier studies have reported intergenerational recurrence of low birth weight,[4] as well as preeclampsia.[5] Pregnancy-induced hypertension is the general classification for hypertension diseases during pregnancy, which include pregnancy-induced hypertension (without proteinuria), pre-eclampsia (with proteinuria), and eclampsia (pre-eclampsia with convulsions). This disease is responsible for high maternal and perinatal morbidity and mortality rates, and is one of the main public health problems.[6]

The classification of hypertensive disorders complicating pregnancy by the Working Group of the National high blood pressure education program [NHBPEP] (2000) is shown in table. There are four types of hypertensive disease.[7] 1.Gestational hypertension. 2. Pre-eclampsia and Eclampsia syndrome 3.Pre-eclampsia superimposed on chronic hypertension. 4. Chronic hypertension. Pre-eclampsia is currently believed to be a two stage disease,[7] with shallow cytotrophoblastic invasion of maternal spiral arterioles initially resulting in placental insufficiency. Acute or chronic uteroplacental insufficiency results in antepartum or intrapartum anoxia that may lead to fetal death, IUGR and /or preterm delivery. Prematurity is the most important factor responsible for increased perinatal morbidity and mortality. Neonatal complications occurring in babies of pre-eclamptic mothers closely related to the severity of hypertension and proteinuria.

Pre-eclampsia is known to be associated with adaptive changes in the fetal circulation and placentally derived factors implicated in the pathogenesis of the maternal manifestations of disease are known to contribute to the development of neonatal thrombocytopenia and growth restriction. Severe hypertension causes a marked imbalance in the haemostatic system of the mother and the neonate. The purpose of this study is to determine the hematological parameters and morbidity in neonates born to mothers with gestational hypertension, pre-eclampsia or eclampsia syndrome and in neonates born to normotensive mothers without any maternal complications or medical illness with special reference to platelet count and neutrophil count.

MATERIAL AND METHODS

A prospective study conducted on 50 neonates born to pregnant women complicated with gestational hypertension, pre-eclampsia or eclampsia and 50 neonates born to normotensive mothers recruited at Neonatal Intensive Care Unit and Post natal wards who were delivered between November 2013 to October 2014.

In this study were included two groups: The case group included 50 neonates born to mothers with gestational hypertension, pre-eclampsia or eclampsia with the following criteria [a]Inclusion criteria includes Neonates born to pregnant women with: Gestational hypertension, Preelampsia , Eclampsia [b].Exclusion criteria includes Babies born to mothers when pregnancy is complicated by any other risk factors for increase in

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maternal or fetal morbidity and mortality such as :Rh incompatibility ,Diabetes Mellitus , Any other medical illness such as severe anemia, chronic hypertension, renal disease, heart disease, connective tissue disease and those who received drugs like aspirin which were likely to cause change in hematological profile were excluded from the study. Babies born to mothers with hypertension diagnosed before 20 weeks of gestation. Babies born with congenital malformations.The control group includes 50 full term apparently healthy newborns born to normotensive mothers without maternal complications were included and matched for gestation with the study group.

All neonates included in the study were had the following questionary and through clinical examination. Two ml of cord blood anti coagulated with EDTA was collected from these babies and various hematological parameters were studied: Hb, TC, DC, Platelet count and the red cell indices were estimated using automated cell counter method. Peripheral blood smear and nucleated RBC's examined using the smear stained with Leishmenn's stain. Reticulocyte count estimated using the peripheral smear stained with supravital stain. PT and aPTT is estimated using 3.2% Trisodium citrate anticoagulant in 1:9 ratio i.e. 0.2 ml anticoagulant and 1.8 ml blood. Bleeding time estimated using Duke's method and clotting time estimated using Lee and White's method. All data were tabulated and statistically analyzed. Sensitivity, specificity, positive predictive value, negative predictive value of both the groups was assessed and compared using suitable statistical tests. Analysis of variance (ANOVA) has been used to find the significance of study parameters between three or more groups of patients, Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups on metric parameters. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. Pearson's correlation has been used to show the relationship between the mothers and the babies' values. Statistical software SPSS version 20.0 was used for the analysis of the data, Harvard Graphic Version 4.0 software was used for generate graphs

RESULTS

The mean value of platelet count were significantly lower in study group compared to control group which was highly Statistical significant ($p<0.001$). The mean value of PT, aPTT, BT and CT were significantly higher in study group, as compared to control group. The statistical analytic differences were highly significant in all parameters i.e. PT, aPTT, BT and CT ($P<0.001$). Mean value of TLC and ANC were significantly lower in study group as compared to control group which was highly Statistical significant ($P<0.001$). Mean value of hemoglobin was non-significant ($p>0.05$) while mean value of Reticulocyte count, Band Cell, I/T Ratio, nRBC Counts were significantly higher in Study group as compared to Control group($p<0.001$).

Out of total 50 cases, CRP was positive in only 16 cases and out of these cases 3 belonged to GHTN, 12 belonged to Pre Eclampsia and 1 belongs to Eclampsia. Out of total 5 gestational hypertensive cases, one had neonatal hyperbilirubinemia (NNH) and one neonatal septicemia (NNS) with respiratory distress syndrome (RDS) while 2 other cases had NNS with NNH while 1 case was normal. Out of total 42 pre-eclampsia cases, 5 cases had NNS with NNH, 4 cases had NNS with RDS, 3 cases had NNH, 2 cases had MAS while 1 each case had HIE-II and TTN while 26 cases were normal. Out of total 3 eclampsia cases 1 each case belonged to NNH, NNS with RDS and normal respectively. That means total morbidity were 44% in study group. Percentage of SGA babies in study group and control group had 38% & 10% which was highly significant ($P<0 .001$).

DISCUSSION

Hypertensive disorders are one of the most common obstetric complications in pregnancy. These disorders provide great challenges for obstetricians and neonatologists because they are associated with a number of adverse maternal outcomes and short and long term neonatal complications. Gestational hypertension, preeclampsia and eclampsia syndrome have important implications for the mother and her baby, suggesting that it is not a simple gestational disorder but a clinical syndrome involving important maternal and fetal vascular alterations that can persist and cause diseases in later life.[8] The mean value of platelet count were significantly lower in study group as compared to control group which was highly Statistical significant. We observed, the mean platelet count were 1.19 lakh/mm3 in study group as compared to control group 2.66 lakh/mm3 which is highly significant ($p<0.001$) Rote et al,[9] observed that PIH can be complicated by maternal or fetal thrombocytopenia, or both. In order to investigate possible immunologic causes of these thrombocytopenias, platelet-associated IgG (PAIgG) and IgM (PAIgM) were measured in mothers with PIH and in their infants.

Presence of Platelet-associated IgM on fetal platelets, evidence of a fetal autoimmune reaction in pregnancy induced hypertension. A study by Romero et al,[10] thrombocytopenia (platelet count less than 100,000/mm3) was found in 11.6% of all patients with PIH. Thrombocytopenia was also associated with a higher incidence of preterm delivery and intrauterine growth retardation. The mean value of PT, aPTT, Bleeding Time and Clotting time were significantly higher in study group, as compared to control group. Agarwal et al,[11] in which, the values of PT, partial thromboplastin time with kaolin (PTTK), Thrombin Time (TT), Fibrinogen Degradation Products (FDP) were significantly raised and Fibrinogen and Platelet count were reduced significantly in both term and preterm test groups as compared to controls. Agarwal et al,[12] who found that significant correlation existed between decreasing gestational age and alterations in all coagulation parameters. Higher incidence of prematurity, hyper-bilirubinaemia and significant prolongation in PT, PTTK and TT values were observed with increasing severity of grade of gestational hypertension.

The mean of TLC and ANC were 10.08 & 6.49 thousand/mm3 in study group compared to 13.79 & 8.67 thousand/mm3 in control group respectively, which was highly significant.($p<0.001$). A study by Mouzinho et al,[13] reported that 40% to 50% of neonates studied developed neonatal neutropenia, ($p<0.01$) It is a transient hematologic alteration, lasting days to weeks, related to the severity of pregnancy-induced hypertension. Neutropenia mainly affects the smaller and younger neonates and may be associated with an increased risk of nosocomial infection. Our study results was similar to another study by Patricia et al,[21] which showed that infants born to mothers with gestational hypertension, pre-eclampsia, or eclampsia syndrome were associated with leucopenia, absolute neutropenia and thrombocytopenia. Mean value of hemoglobin was non-significant ($P>0.05$) while mean value of Reticulocyte count, Band Cell, I/T Ratio, nRBC Counts were significant and Statistically higher in Study group as compared to Control group($p<0.001$). We observed the mean Hb value were 16.92 gm% in study group compared to control group 17.38%, which is

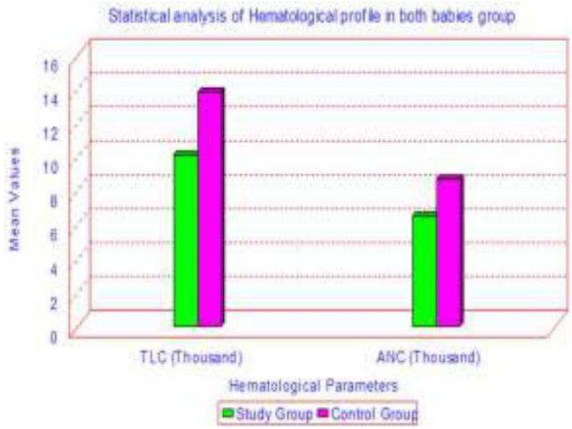

Figure 1: Statistical analysis of hematological profile in both babies group

Table 1: Statistical analysis of Platelet count in both groups

Investigations	Groups				t-value	P-value
	Study		Control			
	Mean	SD	Mean	SD		
Platelet Count (lakh/ mm^3)	1.19	0.40	2.66	1.09	8.959	<0.001

Table 2: Statistical analysis of Coagulation profile in both groups

Investigations	Groups				t-value	P-value
	Study		Control			
	Mean	SD	Mean	SD		
PT (sec)	23.86	1.60	14.50	0.91	35.957	<0.001
aPTT(sec)	66.12	2.63	25.62	1.14	99.833	<0.001
Bleeding Time(min)	5.08	0.52	2.56	0.63	21.830	<0.001
Clotting Time (min)	6.17	0.60	2.28	0.63	31.711	<0.001

Table 3: Statistical analysis of Hematological profile in both groups

Hematological Parameters	Groups				t-value	P-value
	Study		Control			
	Mean	SD	Mean	SD		
Total Leukocyte Counts (Thousands/mm3)	10.08	5.24	13.79	3.95	3.990	<0.001
Absolute Neutrophil Counts (thousands/mm3)	6.49	2.65	8.67	3.24	3.673	<0.001

Table 4: Distribution of cases according to diagnosis in study group

Newborn Diagnosis	Mother Diagnosis						Total (n=50)	
	Gestational HTN (n=5)		Pre-Eclampsia (n=42)		Eclampsia (n=3)			
	No.	%	No.	%	No.	%	No.	%
Hypoxic Ischemic Encephalopathy-II	0	-	1	2.4	0	-	1	2.0
Meconium Aspiration Syndrome	0	-	2	4.8	0	-	2	4.0
Neonatal Hyperbilirubinemia	1	20.0	3	7.1	1	33.3	5	10.0
Neonatal Septicemia with Respiratory Distress Syndrome	1	20.0	4	9.5	1	33.3	6	12.0
Neonatal Septicemia with Neonatal Hyperbilirubinemia	2	40.0	5	11.9	0	-	7	14.0
Transient Tachypnoea of Newborn	0	-	1	2.4	0	-	1	2.0
Normal	1	20.0	26	61.9	1	33.3	28	56.0
Total	5	100	42	100	3	100	50	100

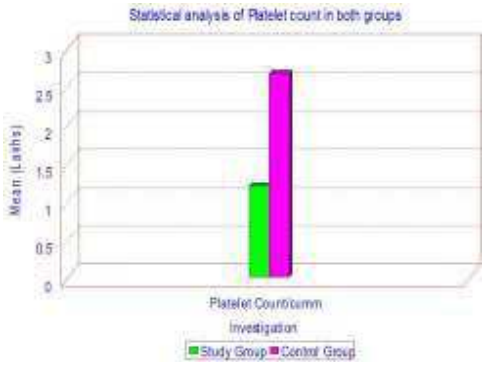

Figure 2: Statistical analysis of platelet count in both groups

insignificant(p value <0.417). Sivakumar et al,[14] mean Hb value 17.98 gm% in study group compared to control group 17.33%, which is insignificant (p value >0.05).

In study group 32% neonates had CRP while in control group only 6% cases had CRP positive. This difference was found statistically significant (OR-0.136; 95% CI 0.037-0.503; p<0.01). Tsoa et al,[15] observed that CRP was detecting inflammation, which was significantly increased in infant of preeclamptic mother. Mosayeb et al,[16] had also found sepsis, Positive cultures including blood, urine and CSF were observed in 16.6%, 11.9% and 7.1% of infants respectively. They were almost all preterm neonates. There was concerned about the possible relationship between infant of hypertensive mother and sepsis. Eeltink et al,[17] observed in which 44.7% of cases had jaundice as compared to control group while current study had 22% hyperbilirubinemia. It was different from study by Sivakumar et al30 based on morbidity and mortality, in which 5 (10%) babies born to mothers with PIH developed neonatal sepsis, of which 2 (4%) developed Necrotizing enterocolitis and 3(6%) died.

CONCLUSION

The results of the study revealed that newborn, born to mothers specially with gestational hypertension, pre-eclampsia and eclampsia were more prone for development of prematurity (34%), small for gestational age (38%), leucopenia, neutropenia, thrombocytopenia with deranged coagulation profile, increased CRP(32%), reticulocyte count, band cell, I/T ratio and circulating nucleated RBCs during the early neonatal period and these newborn were more prone to increased morbidity like sepsis (26%), jaundice (22%), RDS (12%), bleeding tendencies (8%), Meconium aspiration syndrome (4%), HIE-II (2%) and TTN (2%). Early hematological screening of these babies is recommended to facilitate early detection and management of serious neonatal complications to decrease morbidity, improved growth, development and survival.

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