

# Study of hematological and coagulation profile of term neonates born to mothers with PIH as compared to term neonates born to normotensive mothers

Roopa B Mangshetty<sup>1\*</sup>, Satish Reddy H<sup>2</sup>, Sharanagouda Patil<sup>3</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Resident, <sup>3</sup>Professor and HOD, Department of Paediatrics, Mahadevappa Rampure Medical College, Kalaburagi, Karnataka, INDIA.

Email: [rmangshetty@gmail.com](mailto:rmangshetty@gmail.com) [reddysatish92@gmail.com](mailto:reddysatish92@gmail.com)

## Abstract

**Objectives:** To study the changes in Hematological and Coagulation profile of newborns born to mothers with hypertensive disorders of pregnancy and in neonates born to normotensive mothers. **Methods:** A prospective study to determine the hematological and coagulation parameters conducted on 100 neonates born to mothers with hypertensive disorders of pregnancy in comparison to 100 healthy neonates born to normotensive mothers born during the same period recruited from postnatal wards during December 2015 to May 2017. **Results:** There was significantly higher incidence of thrombocytopenia, increased Red cell count and Mean corpuscular volume in study group compared to control group which was highly statistical significant. The mean value of PT and a PTT were significantly higher in study group as compared to control group. Also there was increased need for caesarean section and had a higher number of IUGR and SGA babies in study group compared to control group. **Conclusion:** 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:** Pregnancy induced hypertension; Hematological profile; Coagulation profile; Newborn.

## \*Address for Correspondence:

Dr. Roopa B. Mangshetty, Associate Professor, Department of Paediatrics, Mahadevappa Rampure Medical College, Kalaburagi, Karnataka, INDIA.

Email: [rmangshetty@gmail.com](mailto:rmangshetty@gmail.com)

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proportion to the severity of the hypertensive disorders. There is higher incidence of neonatal morbidity as a consequence of hypertension during pregnancy. In consequence these children are at risk for intra-uterine growth restriction and may be delivered prematurely. They may also suffer from the consequences of operative deliveries and the adverse effects of maternal drugs. These neonates may also have a spectrum of hematological and coagulation changes which may add to the existing morbidity in them<sup>3</sup>. The relative intrauterine hypoxia predisposes these babies to birth asphyxia and meconium aspiration syndrome. 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. In this study, an attempt has been made to document the

## INTRODUCTION

Hypertensive disorders of pregnancy complicate about 8% of all gestations<sup>1</sup>. Pregnancy induced hypertension (PIH) is one of the most common causes of both maternal and neonatal morbidity<sup>2</sup>. Hypertensive disorders of pregnancy cause fatal adversity by reducing the blood supply to the uteroplacental unit and causing placental dysfunction. Fatal complications increase indirect

haematological and coagulation profile of term neonate born to mother suffering from hypertensive disorders of pregnancy and it has been compared with term neonate born to normotensive mother without any maternal complications or medical illness with special reference to platelet count.

## MATERIAL AND METHODS

This prospective case control study was conducted on neonates recruited from Post natal wards who were delivered at Basaveshwara Teaching and General Hospital and Sangameshwara Teaching and General Hospital attached to MahadevappaRampure(MR) Medical college, Kalaburagi, from December 2015 to May 2017. The study was approved by the institute research council and informed consent was taken from the patients for inclusion in the study. Cases comprised of 100 term neonates born to mothers diagnosed as having pregnancy induced hypertension(gestational hypertension, preeclampsia and eclampsia syndrome). Controls comprised of 100 term babies born to mothers not having PIH and born during the same period. Babies with congenital malformations, severe birth asphyxia, or any illness in the mother likely to cause changes in the hematological profile like severe anemia, connective tissue diseases, diabetes mellitus and chronic hypertension and those who received drugs like aspirin were excluded from the study. Two ml of blood anti-coagulated with EDTA was collected from these babies and various hematological parameters were studied. These included hemoglobin, total and differential counts, platelet count, red cell indices like PCV, MCV, MCH, MCHC and the peripheral blood smear, reticulocyte count. Also 2ml of blood using 3.2% Trisodium citrate anticoagulant vial in 1:9 ratio i.e. 0.2 ml anticoagulant and 1.8 ml blood was collected for estimation of Coagulation parameters PT/INR and APTT. Bleeding time was estimated using DUKE'S method and clotting time was estimated using LEE and WHITE'S method. Similar samples were collected from the control babies and mothers. Maternal details like age, parity, immunization status, gestational age, onset of symptoms, blood pressure recordings and presence of seizures were noted. Details of labour, mode of delivery or any complications during labour were also recorded. Details of the baby like time of birth, sex, Apgar scoring and resuscitation were recorded. The infants were examined and birth weight and gestational age (by modified Ballard's scoring) were noted. Statistical analysis was carried out using paired sample t test for the comparison of the differences of the means, p value of  $<0.05$  was taken as significant.

## RESULTS

Of the 100 mothers with hypertensive disorders of pregnancy in this comparative study, 58(58%) cases were of gestational hypertension and 29 (29%) cases were of preeclampsia and 13 (13%) cases were of eclampsia. In this study it was observed that 57% of gestational hypertension, preeclampsia and eclampsia syndrome mothers needed LSCS whereas only 43% of mothers in the control group needed LSCS. NVD cases were more in the control group that is 57%, there were 2% of cases asstd. deliveries in study group. There was statistical significant difference of mode of deliveries among study and control groups ( $P<0.05$ ). Study observed that 9% of cases had intrauterine growth retardation while only 2% had intrauterine growth retardation in control group. Mean platelet count in neonates born to hypertensive mother (1.90 lakh) was significantly lower ( $P<0.001$ ) than that of control babies (2.33 lakh) in our study. Red cell counts were significantly higher ( $P<0.01$ ) in the study group(5.17 million) as compare to control group(4.70 million). And there was statistical significant difference ( $P<0.05$ ) of MCV among study and control groups(108 vs 105 fl). There were no statistical significant difference of Hb%, TLC, N%, L%, MCH, MCHC and Reticulocyte count among study and control groups ( $P>0.05$ ). Another finding was Study observed that, there was statistical significant difference ( $P<0.05$ ) of PT and APTT among study and control groups. There were no statistical significant difference of INR, BT and CT among study and control groups ( $P>0.05$ ). None of the control babies had any complications and in control group two babies were given transfusion for thrombocytopenia in case group.

**Table 1:** Profile of the Cases and Controls

| Parameter              | Cases    | Controls |
|------------------------|----------|----------|
| Maternal Age (Mean)    | 25.27    | 25.42    |
| Booked                 | 88 %     | 89%      |
| Gestational Age (Mean) | 38.76Wks | 38.70Wks |
| Operative Delivery     | 57%      | 43 %     |
| Birth Weight (Mean)    | 2.81 Kgs | 2.85 Kgs |
| IUGR                   | 9 %      | 2 %      |

**Table 2:** Comparison of hematological parameters among babies in two groups (Cases and Controls)

| Investigations     | Cases<br>(n=100) | Controls<br>(n=100) | p value  |
|--------------------|------------------|---------------------|----------|
| Hb                 | 17.45            | 16.85               | 0.870    |
| MCV                | 108.281          | 05.25               | 0.024    |
| MCH                | 34.23            | 34.31               | 0.855    |
| MCHC               | 32.19            | 32.54               | 0.499    |
| TLC                | 19075            | 18328               | NS       |
| Platelet count     | 1.90lakh         | 2.33lakh            | <0.001** |
| Reticulocyte count | 2.51             | 2.33                | 0.265    |
| Red Cell count     | 5.17mil          | 4.70mil             | <0.001** |

**Table 3:** Statistical analysis of Coagulation profile in both groups

| Investigations      | Cases<br>(n=100) | Controls<br>(n=100) | p value |
|---------------------|------------------|---------------------|---------|
| PT ( sec)           | 18.71            | 17.04               | 0.008   |
| aPTT(sec)           | 41.85            | 37.28               | 0.004   |
| Bleeding Time(min)  | 2.64             | 2.44                | 0.024   |
| Clotting Time (min) | 4.07             | 4.08                | 0.948   |

## DISCUSSION

Hypertensive disorders of pregnancy are one of the most common medical complications of pregnancy. It is generally more common in the developing countries as compared to developed world. Various risk factors like extreme age, nulliparity and race have been documented to be associated with PIH by various authors in their studies.<sup>4</sup> These disorders are big challenges for obstetricians and neonatologists because they are associated with various adverse maternal outcomes and short and long term neonatal complications. Severe hypertension in a pregnant woman is a multisystem disease and a threat to the well-being of both mother and child. Complications in the mother include eclampsia, abruption, oliguria, anuria, dimness of vision, and the HELLP syndrome [hemolysis, elevated liver enzymes, and low platelet counts].<sup>5</sup> Intrauterine deaths, intrauterine growth restriction, prematurity and perinatal asphyxia are common complications in the baby. The most significant difference found in our study was the presence of thrombocytopenia in the babies born to mothers with PIH.<sup>6,7</sup> Thrombocytopenia was present in 29% of our cases and 7% of controls, P value<0.0001 which is statistically significant, compared with the findings of Brazy *et al*<sup>8</sup> who have noted thrombocytopenia in 36% of infants of mothers with severe PIH and S. Sivakumar *et al*<sup>9</sup> who had noted thrombocytopenia in 22% of infants of mothers with severe PIH. Thrombocytopenia in neonates born to HDP mothers was also proved by various other authors [Brazy *et al*<sup>10</sup>, Prekshya *et al*<sup>11</sup>, Bhat *et al*<sup>12</sup>. Out of 29 babies having thrombocytopenia, 4 babies had platelet counts less than 1 lakh while the rest had counts between 1 -1.5 lakhs. Only one baby had counts below 50,000. Neutropenia has also been well documented in the infants of mothers with PIH.<sup>13-15</sup> In fact it has been documented as the most common variety of congenital neutropenia.<sup>16</sup> We were unable to document neutropenia in any of the infants coinciding with finding of S. Sivakumar *et al*<sup>9</sup>. There was no increase in the number of immature cells seen in the peripheral smear in the infants born to mothers with PIH. There was no significant difference seen in the hemoglobin concentration, mean corpuscular hemoglobin or mean corpuscular hemoglobin concentration between cases and controls. The mean corpuscular volume was found to be higher in case babies when comparable to controls and

this observation was also similar to that reported by S. Sivakumar *et al*<sup>9</sup> however no other literature could be found which supports this observation. The mean value of PT and aPTT were significantly higher in the study group as compared to control group and our finding was comparable to that of Agarwal *et al*<sup>17</sup> and Sameer Jagrwal *et al*.

## CONCLUSION

The hematological and coagulation changes should be kept in mind while interpreting the values in these babies. As these babies are more prone for development of prematurity, intrauterine growth retardation, thrombocytopenia, increased predisposition to infections, disseminated intravascular coagulation and bleeding manifestations including intracranial hemorrhage during the early neonatal period, these babies should be closely monitored and managed in order to decrease the perinatal morbidity and mortality.

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