

Study of hematological profile of neonates born to mothers with hypertensive disorders of pregnancy as compared to normotensive mothers

Jaiom Dagar^{1*}, Chandershekhar Aundhakar¹

¹Department of Paediatrics, Krishna Institute of Medical Sciences, Karad, Maharashtra, INDIA.

Email: jai.dagar05@gmail.com

Abstract

Background: Pregnancies that are affected by hypertension have been accepted to have higher incidence of neonatal morbidity compared to those pregnancies with normal blood pressure, also these are complicated by an increased risk of premature births and LBW. These neonates also have a spectrum of hematological changes. **Objective:** To study the hematological profile of neonates born to mother with hypertensive disorders of pregnancy in comparison to normotensive mothers. **Methodology:** A 2 years case control study was conducted in Pediatric department of KHMRC at KIMS, Deemed University Karad. Study consisted of 200 cases (Neonates born to mothers with hypertensive disorders of pregnancy) and controls (Neonates born to normotensive mothers) each. The study was approved by the institute research council and informed consent was taken from the patients for inclusion in the study. **Results:** In our study Neutropenia was seen in 42% of neonates born to HDP mothers as compared to 8% in control group. Mean ANC in neonates born to mother to hypertensive disorders of pregnancy (5061) was significantly lower than that of babies born to normotensive mothers (8261) in our study. In this study, out of 200 babies born to mothers with HDP 29% babies were Preterm while 71% babies were Term. **Conclusion:** Mean platelet count in neonates born to hypertensive mother was significantly lower than that of control babies in our study.

Key words: Neutropenia, haematology, absolute neutrophil count.

*Address for Correspondence:

Dr. Jaiom Dagar, Department of Paediatrics, Krishna Institute of Medical Sciences, Karad, Maharashtra, INDIA.

Email: jai.dagar05@gmail.com

Received Date: 01/02/2016 Revised Date: 15/03/2016 Accepted Date: 10/04/2016

Access this article online

Quick Response Code:	Website: www.medpulse.in
	DOI: 12 April 2016

INTRODUCTION

A spontaneous and an uncomplicated normal vaginal delivery would be the aim of each pregnancy. However, this is often not achieved. Hypertension could complicate a pregnancy. Pregnancies that are affected by hypertension have been accepted to have higher incidence of neonatal morbidity compared to those pregnancies with

normal blood pressure, Pregnancies with hypertensive disorders are complicated by an increased risk of premature births and low birth weight (LBW), as compared to the healthy ones.¹ Pregnancy induced hypertension (PIH) is one of the most common causes of both maternal and neonatal morbidity.² Hypertensive disorders of pregnancy cause fatal adversity by reducing the blood supply to the uteroplacental unit and causing placental dysfunction. Fatal complications increase in direct 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 high rate of operative deliveries and the adverse effects of maternal drugs. These neonates may also have a spectrum of hematological changes which may add to the existing

morbidity in them.³ Neutropenia has also been well documented in the infants of mothers with PIH. In fact it has been documented as the most common variety of congenital Neutropenia.⁴ The relative intrauterine hypoxia predisposes these babies to birth asphyxia and meconium aspiration syndrome. Medications used to treat the mother also affect the baby adversely. It is lighter in weight than normal due to the reduction in its blood supply in hypertensive disorders of pregnancy. In this study, an attempt has been made to document the haematological profile of neonate born to mother suffering from hypertensive disorders of pregnancy and it has been compared with neonate born to normotensive mother.

MATERIALS AND METHODS

A 2 years case control study was conducted in Pediatric department of Krishna hospital and research centre in Krishna institute of medical sciences, Deemed University Karad. Study consisted of 200 cases (neonates born to mothers with hypertensive disorders of pregnancy) and controls (neonates born to normotensive mothers) each. The study was approved by the institute research council and informed consent was taken from the patients for inclusion in the study.

The Inclusion Criteria

- a) Neonates born to mothers diagnosed as having hypertensive disorders of pregnancy.
- b) Neonates born to mother with normal blood pressure and admitted during same period.

Exclusion Criteria

- a) Medical complications to mother like severe anaemia, cardiac or respiratory diseases, connective tissue disorder and diabetes mellitus, which may influence the hematological profile of newborn.
- b) Neonates with major congenital anomalies and large for date were excluded from the study.
- c) Still births were excluded from study.
- d) Those cases in which all the investigations could not be completed.

Statistical analysis was carried out using paired sample t test for the comparison of the differences of the means and p value of < 0.05 was taken as significant. GraphPad INSTAT software was used for statistical analysis.

RESULTS

Of the 200 mothers with hypertensive disorders of pregnancy in this comparative study, 101(50.5%) cases were of gestational hypertension and 79 (39.5%) cases were of preeclampsia-eclampsia. Chronic hypertension was diagnosed in 12 cases (6.0%). Patients who had chronic hypertension with superimposed preeclampsia contributed to 8 (4.0%) of cases. In this study, among mothers with hypertensive disorders of pregnancy (n=200) 14.5% mothers presented with convulsions, the others had symptoms like headache (78.0%) and blurring of vision (17.0%). Pedal edema was observed among 92.0% mothers suffering from hypertensive disorder of pregnancy.

Table 1: Mode of delivery

Type	No. of cases (n=200)	No. of controls (n=200)
Spontaneous labour	46(23%)	131(65.5%)
Induced	111(55.5%)	45(22.5%)
Assisted	10(5%)	6(3%)
LSCS	33(16.5%)	18(9%)

In this study, 55.5% of mothers with hypertensive disorder of pregnancy needed induction of labor for eminent eclampsia or eclampsia. Only 23.0% of mothers with hypertensive disorder of pregnancy delivered vaginally spontaneously. In our study, out of 200 babies born to mothers with HDP 29% babies were Preterm while 71% babies were term and out of 200 babies born to normotensive mothers, 12% babies were Preterm while 88% babies were term. In our study, of the total cases 55.5% were male while 44.5% were female. In our study, of the total controls 54% were male while 46% were female. In the present study no statistical significance found between cases and controls (p= 0.2412)

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

Investigations	Cases (n=200)	Controls (n=200)	p value
Hb	15.70	15.69	0.587
PCV	51.82	51.57	0.945
MCV	107.96	105.43	0.016
MCH	36.13	35.32	0.052
MCHC	33.44	32.46	0.951
nRBC	13.33	8.44	<0.001**
TLC	15314	15617	NS
ANC	5061	8261	<0.001**
Platelet count	1.42	2.09	<0.001**

Mean platelet count in neonates born to hypertensive mother (1.42 lakh) was significantly lower than that of control babies (2.09 lakh) in our study. In our study Neutropenia was seen in 42% of neonates born to HDP mothers as compared to 8% in control group. Mean absolute neutrophil count in neonates born to mother to hypertensive disorders of pregnancy (5061) was significantly lower than that of babies born to normotensive mothers (8261) in our study. Another finding was the increased number of nucleated RBCs seen in the infants born to mothers with HDP. Thrombocytopenia was present in 29% of our cases and 7% of controls, P value < 0.001 which is statistically significant. In our study Neutropenia was seen in 42% of neonates born to HDP mothers as compared to 8% in control group, P value < 0.001 which is statistically significant. In this study, 54 babies out of 200 live born babies of mothers with HDP, needed NICU care, that is, the NICU admission was 27% among babies born to mothers with HDP. While only 11.5% of babies born to normotensive mothers were admitted to NICU. Increased incidence of NICU admission in babies born to mothers with HDP may be explained on the basis that the incidence of prematurity and IUGR was high.

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.⁶ 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. In present study, among mothers with hypertensive disorders of pregnancy (n=200) 14.5% mothers presented with convulsions, the others had symptoms like headache (78.0%) and blurring of vision (17.0%). In our study, 101(50.5%) cases were of gestational hypertension and 79 (39.5%) cases were of preeclampsia-eclampsia. Chronic hypertension was diagnosed in 12 cases (6.0%). Patients who had chronic hypertension with superimposed preeclampsia contributed to 8 (4.0%) of cases. Anand and Kirshnanand *et al*⁷ in their study found that majority of the cases had preeclampsia (66.36%) and the rest eclampsia (33.64%). Wolde *et al*⁸ in their study showed that preeclampsia was the most common hypertensive disorder of pregnancy (51.9%); followed by eclampsia (23.4%), HELLP syndrome (8.9%), mild preeclampsia (7.6%), and simple gestational HTN (5.1%). In our study, out of 200 babies born to mothers with HDP

29% babies were Preterm while 71% babies were term and out of 200 babies born to normotensive mothers, 12% babies were Preterm while 88% babies were term. According to previous studies, pregnancies complicated by HDP are characterized by an increase in the number of preterm delivery, LBW, and VLBW infants, compared with normal pregnancies.^{8,9} In our study Neutropenia was seen in 42% of neonates born to HDP mothers as compared to 8% in control group. This finding was similar to that observed by S. Sivakumar *et al*⁴ and Prekshya *et al*¹⁰. Thrombocytopenia was present in 29% of our cases and 7% of controls, P value < 0.001 which is statistically significant. Thrombocytopenia in neonates born to HDP mothers was proved by various authors [Bray *et al*³, Prekshya *et al*¹⁰, Bhat *et al*¹¹ and Shivkumar *et al*⁴. Leucopenia was noticed in our study however various other authors have noticed leucopenia in their study. Leukopenia was seen in 28.5% of the patients in study done by Mosayebi Z *et al*¹², more common in babies with gestational age of 32 - 37 weeks. Harms *et al*. demonstrated leukopenia in 21% of the affected infants¹³. Mean absolute neutrophil count in neonates born to mother to hypertensive disorders of pregnancy (5061) was significantly lower than that of babies born to normotensive mothers (8261) in our study. Neutropenia has been well documented in the neonates born to mothers with PIH.^{14,15} However Shivkumar *et al*⁴ were unable to document neutropenia in any of the infants. In our study, there was no significant difference seen in the hemoglobin concentration, mean corpuscular haemoglobin or mean corpuscular hemoglobin concentration between cases and controls which are similar to study done by Shivkumar *et al*⁴. In this study, 54 babies out of 200 live born babies of mothers with HDP, needed NICU care, that is, the NICU admission was 27% among babies born to mothers with HDP. While only 11.5% of babies born to normotensive mothers were admitted to NICU.

CONCLUSION

In this study, an attempt was made to study the hematological profile of neonates born to mothers with gestational hypertension, preeclampsia and eclampsia syndrome and to compare them with neonates born to normotensive mothers. In our study we observed many changes in the hematological parameters (thrombocytopenia, Neutropenia etc) of the babies born to mothers with gestational hypertension, preeclampsia and eclampsia syndrome when compared to the babies born to normotensive mothers. The knowledge of these changes is important while interpreting the hematological values of such babies. Since babies born to mothers especially with HDP are prone for preterm delivery, low birth

weight and intrauterine growth retardation, Neutropenia and thrombocytopenia during the early neonatal period, they should be closely monitored so as to facilitate early detection and management of sepsis and bleeding tendencies in order to improve morbidity and mortality among newborns.

REFERENCES

1. Ferrazzani S1., Luciano R., Garofalo S., D'Andrea V., De Carolis S., De Carolis MP., Paolucci V., Romagnoli C and Caruso A (2011). "Neonatal outcome in hypertensive disorders of pregnancy." *Early Hum Dev* 2011; 87 (6) 445-9.
2. Cunningham FG et al. Hypertensive disorders in pregnancy. In MacDonald, PC et al, eds. *Williams Obstetrics*, 21st ed. 2003; McGraw Hill; 557-618.
3. Bray JE, Grimm JK, Little VA. Neonatal manifestations of severe maternal hypertension occurring before the thirty sixth week of pregnancy. *J Pediatr*. Feb 1982;100(2):265-71.
4. Sandhya Sivakumar, B. Vishnu Bhat and Bhawana Ashok Badhe. Effect of Pregnancy Induced Hypertension on Mothers and their Babies. *Indian Journal of Pediatrics*, Volume 74—July, 2007. 623-625.
5. Lowe SA ,Brown MA ,Dekker GA ,Gatt S ,McLintock CK ,McMahon LP, et al. Guidelines for the management of hypertensive disorders of pregnancy 2008. *Australian and New Zealand Journal of Obstetrics and Gynaecology*. 2009; 49(3):242-246.
6. Wolde Z, Segni H, Woldie M. Hypertensive disorders of pregnancy in Jimma University specialized hospital. *Ethiop J Health Sci* 2011;21:147-54.
7. Anand S, Kirshnanand. Perinatal outcome in growth retarded babies born to normotensive and hypertensive mothers: A prospective study. *People's J Sci Res* 2012;5:24-8.
8. Moutquin JM., Rainville C., Giroux L, Raynauld P., Bilodeau R and Amyot G (1990). Is a threshold increase in blood pressure predictive of preeclampsia? A prospective cohort study. *Clin Exp Hypertens B* ; 9(2):225-35.
9. Xiong X and Fraser WD (2004) . Impact of pregnancy-induced hypertension on birth weight by gestational age. *Paediatric Perinat Epidemiol* ; 18(3):186-91.
10. Prekshya L Prakash, P Sunil Kumar, M Venkata Murthy, KR Haricharan. "Assessment of hematological profile of newborn at birth, born to mothers with gestational hypertension, preeclampsia and eclampsia syndrome". *Journal of Evolution of Medical and Dental Sciences* 2013; Vol2, Issue 34, August 26; Page: 6360-6369.
11. Bhatt YR, Cheri and CS. Neonatal thrombocytopenia associated with maternal pregnancy induced hypertension. *Indian J Pediatr*. Jun 2008; 75(6):571-3.
12. Ziba Mosayebi, Shahin Nariman, Ladan Hosseini, Amir Hossein Movahedian. *Journal of Comprehensive Pediatrics*. 2013 November; 4(4): 194-9.
13. Harms K, Rath W, Herting E, Kuhn W. Maternal hemolysis, elevated liver enzymes, low platelet count, and neonatal outcome. *Am J Perinatol*. 1995;12(1):1-6.
14. Koenig JM, Yoder CM. Neonatal neutrophils: the good, the bad, and the ugly. *Clin Perinatol* 2004; 31 : 39-51.
15. Christensen RD. Calhoun DA. Congenital neutropenia. *Clin Perinatol* 2004; 31 : 29-38.

Source of Support: None Declared
Conflict of Interest: None Declared