NEONATAL MORTALITY AND MORBIDITY IN PREGNANCY INDUCED HYPERTENSION: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT: BACKGROUND: Pregnancy induced Hypertension (PIH) is one of the common complications which contributes to significant maternal and perinatal morbidity and mortality. Effective management improves outcome of both mother and the baby **OBJECTIVES:** To study the morbidity and mortality in babies born to mothers with pregnancy induced hypertension, assess the reasons for the outcome of the baby and monitor the growth and development till the age of 6 months. **METHODS:** This study was conducted at Niloufer Institute of Child Health, Hyderabad a teaching institution which caters to high risk obstetric patients and also has a tertiary level NICU care. Study was conducted over a period of 9 months and 100 cases of PIH were included over a period of 3 months and the babies were followed up till the age of 6 months. A structured proforma was designed and analyzed using Epi info for window statistical software. **RESULTS:** Out of 1461 deliveries, we enrolled 100 PIH cases as per inclusion criteria and studied during 3 months period. Of the study group, 48% were with mild PIH (n=48) and 52% were with severe PIH (n=52). When compared to mild PIH, severe PIH was associated with higher rates of preterm deliveries and it was statistically significant ($P < 0.05$). There were 16 still births and 9 early neonatal deaths occurred with severe PIH. In small for gestational age babies, 6 had asymmetric IUGR and 8 had symmetric IUGR (Ponderal index >2). In NICU admissions Meconium aspiration syndrome (MAS), Hyaline membrane disease (HMD), Birth asphyxia (BA) and sepsis were observed. All the complications were more in severe PIH than mild PIH. After discharge infants were followed up till the age of 6 months. Out of 75 babies discharged, 24 cases were lost to follow up and in the remaining 51 babies, 33 were born to mild PIH mothers, 18 were born to severe PIH mothers. **CONCLUSION:** PIH is one of the major causes of morbidity and mortality in the fetus and newborn. The more severe the PIH, the more adverse is the outcome. Our goal is early detection and prompts Management.

KEYWORDS: PIH Mothers, Neonatal Mortality and Morbidity, Prospective Study.

INTRODUCTION: Pregnancy induced Hypertension (PIH) is one of the common complications met with in pregnancy, and contributes significantly to maternal and perinatal morbidity and mortality.¹

The hypertension develops as a direct result of the gravid state. Effective management plays a significant role in the outcome of the mother and the baby. PIH is divided into three clinical types: Pre-eclampsia, Eclampsia and Gestational hypertension. Preeclampsia and eclampsia are associated with proteinuria and/or edema whereas Gestational hypertension is not associated with gross edema or proteinuria.² A diagnosis of eclampsia is made when a patient demonstrates seizure activity or coma in addition to signs and symptoms of pre-eclampsia.

Hypertension is defined as a sitting systolic blood pressure >140 mmHg and/ or diastolic BP >90 mmHg (two readings taken six hours apart). Proteinuria is defined as >300 mg/ day (24 hour urine collection).^{3, 4} Mild PIH is Sustained rise of BP $>140/ 90$ mmHg but Severe PIH is when one or

ORIGINAL ARTICLE

more features exist i.e., diastolic BP of >110mmHg or systolic > 160mmHg on two occasions at least 6 hours apart, Visual disturbances, Oliguria, Protein excretion > 5gm/24 hour urine specimen and Platelet count <1 lakh/ μ L. (From ACOG Practice Bulletin No.33, January 2002).

The exact pathophysiology is not clear but it is primarily a disorder of placental dysfunction leading to endothelial dysfunction, vasospasm and hypertension.^{5,6} The perinatal mortality in pre-eclampsia in developed countries ranges between 7-10% and in developing countries it is about 20%. Because of hypoxic stress, fetal catecholamine secretion may promote glucogenolysis and decrease fetal insulin concentration as well as glucose utilization which can result in IUGR.⁷

MATERIAL AND METHODS: This study was conducted at Niloufer Institute of Child Health, Hyderabad over a period of 9 months from December 2010 to August 2011 and this is a prospective observational study. Ethics committee permission was taken from institutional Ethics committee, Osmania Medical College. The study population included 100 consecutive cases of PIH over a period of 3 months and the babies were followed up till the age of 6 months. Inclusion criteria are atenatal care before 28 weeks, Singleton fetus, Four or more antenatal visits, Date of last menstrual period known and Age of the mother 18-35 years. Exclusion criteria are unregistered mothers with chronic medical problems like diabetes, chronic hypertension, cardiac disease, polyhydramnios, anemia, and too young or too elderly mothers. All pregnant women coming to the antenatal outpatient were screened for PIH and if BP was > 140/90 mmHg, after 20 weeks of gestational age, they were admitted and a second reading was taken 6 hours later, and if the BP was still > 140/ 90mmHg, they were labelled as having PIH and included in the study. Mothers were given proper antenatal care¹¹ They were followed till delivery, and categorized as mild and severe PIH as per definitions. At the time of delivery, the mode of delivery was noted. Still births were noted and their weight was recorded.^{8,9}

If the baby had any complications, they were shifted to NICU. Babies were weighed naked and length was measured by infanto-meter. Gestational age assessment done within 12 hours of life by New Ballard scoring, and also calculated as per last menstrual period. The newborns were classified by comparing their weights against the gestational age, employing the intrauterine growth curves and classified as appropriate for gestational age (AGA), if ranked between the 10th and 90th percentile, small for gestational age (SGA) if below the 10th percentile, and larger for gestational age (LGA) if above the 90th percentile.¹⁰ Normal babies were discharged and complications like prematurity, VLBW, birth asphyxia, respiratory distress syndrome were admitted in NICU.^{12, 13}

FOLLOW UP: the babies were followed up after discharge, till 6 months of age to assess the growth and development. The infant's head circumference, weight and length were recorded and the infant's development was assessed.

RESULTS: The data was recorded on a predesigned proforma, tabulated and analyzed using Epi info for window statistical software. Chi-square test was used to test the association of columns and rows in table data. When the variables are < 10, Yates correction was used. A p value of < 0.05 was considered significant. Out of 100 cases studied during 3 months period, 48% were with mild PIH (n=48) and 52% were with severe PIH (n=52). Most of the cases of mild PIH were detected at or near term, and of severe PIH very early.^{14, 15} Out of 100 babies of PIH, 31 were preterm, and majority were due to severe PIH and it was statistically significant (P < 0.05).

ORIGINAL ARTICLE

Gestational age	Mild PIH (n=48)	Severe PIH (n=52)	Total (n=100)
Pre term	3(6.24%)	28(53.84%)	31(31.0%)
Term	45(93.7%)	24(46.15%)	69(69.0%)

$P = < 0.000008$.

There were 16 still births and 9 cases of early neonatal deaths due to complications and these were also mainly in babies born to severe PIH and this was also statistically significant.

Vitality	Mild PIH (n=48)		Severe PIH (n=52)		Total (n=100)	
	n	%	n	%	n	%
Live born	48	100	36	69.3	84	84.0
Still born	0	0	16	30.7	16	16
Neo mortality	1	2.08	8	15.38	9	9

$P < 0.00008$.

We have compared their weights against the gestational age employing the intrauterine growth curves of Indian standard and also by means of percentiles.

	Mild PIH (n=48)		Severe PIH (n=52)		Total (n=100)	
	n	%	n	%	n	%
AGA	43	89.5	24	60.0	67	76.13
SGA	3	6.24	16	40.0	19	21.59
LGA	2	4.1	0	0	2	2.27

$P < 0.0003$.

The above data shows that severe PIH was associated with SGA.

There were 24 NICU admissions and in them 5 babies had meconium aspiration syndrome (MAS),¹⁶ 9 had hyaline membrane disease (HMD), 18 babies had birth asphyxia (BA) and 2 had sepsis.¹⁷ All the above said complications were more in severe PIH than in mild PIH.

DISCUSSION: our study showed, 14% of all confinements of PIH cases and the perinatal mortality rate was higher (31%) when compared to similar study by Gupta et al (14%). This is probably because ours is tertiary health care teaching institution and caters to high risk obstetric patients.

The perinatal mortality was both because of still births and early neonatal deaths and more so in severe PIH. Outcome in babies born to mothers with mild PIH were comparable to that of babies born to mothers without PIH and mild PIH didn't adversely affect the foetal and neonatal outcome.

Similar study by Brown and Buddle confirmed by multivariate analysis that severe PIH was associated with LBW, and in univariate analysis with a higher incidence of all fetal complications and

ORIGINAL ARTICLE

a higher incidence of SGA babies. Regarding the Incidence of IUGR in general is 10% of all births but in our study the percentage of SGA in PIH was 21.59%.⁷ This was similar to the study by Brown and Buddle which showed a rate of 21% in PIH.

In a study by Sivakumar et al.¹⁸ There was increased incidence of SGA in babies born to PIH mothers (38%) and by Halil Aslan et al,¹⁹ showed a significant difference in the incidence of IUGR (61.2%). This is much higher than our study. On the other hand a study by Solange Regina²⁰ et al in Brazil showed an incidence of SGA as 10.6%, probably because of better economic and nutritional status. A study by Xiong²¹ et al also showed that severe -eclampsia increases the rates of IUGR.

Both forms of IUGR were observed in our study indicating that placental insufficiency can be of varying degrees and of varying duration. The present study showed 31% preterm deliveries. Similar rates (28.8%) were observed in a study by Yadav S et al²² and when compared to mild PIH, severe PIH had increased rates of preterm deliveries (53.84% vs. 6.24%, $p < 0.000008$). When compared to normotensive pregnancies, PIH mothers had increased preterm deliveries (31% vs. 11%, $P < 0.05$). Previous study by Jehan Ara et al showed much higher rates of preterm delivery (61%)²³ and Solange Regina et al showed a much lower rate of preterm delivery (10.6%).

When compared to normotensive pregnancies, still birth rate was higher in PIH (16% vs. 4.83%, $p < 0.005$), more so in severe PIH than mild PIH (16% vs. 0%, $P < 0.00008$). Halil Aslan et al showed a still birth rate of 13.9%, which is comparable to the present study.

Regarding early neonatal mortality, it was 9% in our study (2.1% in normotensive, $P < 0.04$), this is also more in severe PIH than in mild PIH (8% vs. 1%). The overall perinatal mortality in this study was 29%. This is high when compared to other studies by Gupta et al (14%), Jehan Ara et al (13%). In the present study, there were higher rates of NICU admissions in severe PIH (26% vs. 20%, $p < 0.06$).

Jehan Ara et al showed a 42% NICU admission rate and Halil Aslan et al showed that the need for NICU admission is greater in severe pre-eclampsia. Yadav S et al., showed a 40% NICU admission rate. Neonatal complications are birth asphyxia in 18 babies, 5 with MAS and 9 with HMD and 2 with sepsis. The commonest illness in VLBW babies was HMD, which is similar to a study by Jehan Ara et al.

Follow Up: After discharge infants were followed up till the age of 6 months. Out of 75 babies discharged, 24 cases were lost to follow up and in the remaining 51 babies, 33 were born to mild PIH mothers, 18 were born to severe PIH mothers.

	No. of babies < 3 rd percentile	
	Mild PIH	Severe PIH
Weight for GA	2	2
Length for GA	-	5
HC for GA	-	1
Developmental delay	-	3
Data at 6 months follow-up		

One baby was diagnosed to have congenital heart disease (atrial septal defect). One baby expired in 5th month of life due to bronchopneumonia.

ORIGINAL ARTICLE

CONCLUSIONS: PIH is one of the major causes of morbidity and mortality in the foetus and newborn. The more severe the PIH, the more adverse is the outcome. Early detection, close monitoring and timely intervention of mothers with PIH decreases the mortality and morbidity in the newborn by decreasing the still birth rate and perinatal asphyxia.

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ORIGINAL ARTICLE

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Figure 1

ORIGINAL ARTICLE

Figure 2

ORIGINAL ARTICLE

Figure 3

ORIGINAL ARTICLE

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