Original Research Article

An observational study of early neonatal outcome in babies born to mothers with pregnancy induced hypertension

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ABSTRACT

Background: Hypertensive disorders in pregnancy are a major cause of maternal morbidity and mortality accounting for 15-20% of maternal deaths worldwide. In India the incidence of preeclampsia is reported to be 8-10 percent of the pregnancies. Objective of this study was to with the above background, this study was carried out to study early neonatal outcome in babies born to PIH mothers, Measure the adverse neonatal outcomes in the early neonatal period and compare the mode of delivery between control group and PIH group.

Methods: A total of 58 neonates born to mothers diagnosed having gestational hypertension, preeclampsia, eclampsia were taken as tests (group A), and 100 apparently healthy newborns born to normotensive mothers were enrolled as controls (group B) and followed up to 1st week of life. The outcome measures were compared between groups in terms of mode of delivery, preterm delivery, birth weight, APGAR score, intra uterine growth retardation, early neonatal complications.

Results: In group A, 33 had LBW (56.89%) and in group B 18 had LBW (18%). The incidence of preterm deliveries in group A was higher as compared to group B (A- 43.10%, B-17%, p value <0.05). Babies born to PIH mothers had an increased incidence of IUGR, as compared to group B.

Conclusions: PIH is one of the major causes of maternal, fetal and early neonatal morbidity and mortality. In this study authors found that risk of LBW, preterm delivery, NICU admission and IUGR in babies born to PIH mothers statistically significant. Early detection of high-risk individual by well trained personnel and timely referral to advanced tertiary center is necessary in bringing down the maternal and neonatal morbidity and mortality.

Keywords: Intra uterine growth retardation, Low birth weight, Pre-eclampsia, Pregnancy induced hypertension

INTRODUCTION

Hypertensive disorders in pregnancy are a major cause of maternal morbidity and mortality accounting for 15-20% of maternal deaths worldwide.¹

Beyond 20 weeks gestation, preeclampsia complicates 5-8% of pregnancies. Preeclampsia is a syndrome broadly defined by hypertension and proteinuria. However, the diagnosis of preeclampsia encompasses a diverse maternal phenotype.² PIH with severe features complicates < 1% of pregnancies. Eclampsia itself is

much less frequent, occurring in 0.1% of pregnancies.³ The identification of this clinical entity and effective management plays a significant role in the outcome of pregnancy both for mother and baby. Therefore, there is a need for physicians to carefully weigh the risks to both mother and fetus in management decisions. In India the incidence of preeclampsia is reported to be 8-10 percent of the pregnancies. Hypertension in pregnancy strikes mostly the primigravidae women after twentieth week of gestation and frequent occurrences are seen near term. It contributes significantly to the cause of maternal and perinatal mortality and morbidity.³

Fetal and neonatal complications

Fetal risk is related to the severity of PIH, duration of disease, and degree of proteinuria. Diastolic rise is more significant. The major cause of fetal compromise occurs as a consequence of reduced uteroplacental perfusion, Intrauterine death due to spasm of uteroplacental circulation leading to accidental hemorrhage and acute red infarction.

Intrauterine growth restriction due to chronic placental insufficiency, Intrauterine asphyxia, Prematurity, Effects of drugs used to control convulsions, Fetal acidemia, Trauma during operative delivery.

Severe preeclampsia may negatively affect the fetus. This is due to decreased uteroplacental perfusion resulting in increased incidence of IUGR, fetal hypoxia, meconium aspiration syndrome and perinatal death. These babies are frequently delivered prematurely, may tolerate labour poorly, and require resuscitation. PIH is also often associated with encephalopathy. A systemic inflammatory response in fetus could explain link between maternal PIH and encephalopathy. The rate of cerebral palsy in hypertensive group managed expectantly was not high in comparison with controls.⁴ While most effects of PIH put the fetus and newborn at higher risk of complications preeclampsia in mother may also lead to acceleration of maturation of brain and lungs as an adaptation to fetal stress. Early initiation of parturition may also be associated. These Adaptive changes may represent a lifesaving earlier birth of more mature new born and increased survival as long as the unfavorable fetal environment is not too early or too severe.^{5,6} Preeclampsia that requires preterm delivery is associated with adverse maternal and perinatal outcomes in subsequent pregnancies, even if they don't develop pre-eclampsia in a subsequent pregnancy, "they are still at greater risk."⁷ The perinatal mortality in preeclampsia in developed countries ranges between 7-10% and in developing countries it is about 20%. Diastolic blood pressure >95 mm Hg is associated with 3-fold increase in fetal death rate. Fetal mortality markedly increases with rising maternal diastolic pressure and proteinuria. In eclampsia the perinatal mortality is very high to the extent of about 30-50%.

METHODS

This prospective observational study is conducted in a teaching institution which caters to high risk obstetric patients and has tertiary level of NICU care. The study population included PIH cases and babies are followed up to 7th day of life. The study was divided into 2 groups.

Group A: the case group

It will include 58 neonates born to mothers with gestational hypertension, preeclampsia or eclampsia with the following criteria.

Inclusion criteria

- Neonates born to pregnant women with PIH (gestational hypertension, preeclampsia, eclampsia)
- Regular antenatal care
- Singleton fetus
- Three or more antenatal visits
- Age of mother 18 - 36 years.

Exclusion criteria

- Babies born to mothers when pregnancy is complicated by any other risk factors for increase in maternal or fetal morbidity and mortality such as:
 - Rh incompatibility
 - Diabetes Mellitus
 - Multiple pregnancy
- 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 malformation
- Maternal age >36 years and <18 years.

Group B: the control group

It will include 100 apparently healthy newborns born to normotensive mothers without maternal complications, matched for gestation with the study group.

All pregnant women coming to antenatal outpatient were screened for PIH by measuring blood pressure, if initial BP was high or >140/90 mm Hg, 2nd reading was taken after 4 hours and if BP persisted to be high >140/90mmHg, were labeled as PIH and included in study as PIH group.

These women are monitored regularly and if found to have other medical or obstetric complications they are excluded from study. All the mothers are given regular antenatal care, and are followed till delivery and categorized as mild and severe PIH as per definition.

These mothers are monitored on regular day to day basis and the drugs given and complications treated. At the time of delivery, mode of delivery was noted. If the baby developed any complications such babies were shifted to NICU.

RESULTS

The study sample comprised 58 mothers who are booked cases diagnosed to have PIH and had regular antenatal care. Most of the cases were detected in third trimester. One hundred cases admitted as normal pregnancy and

without any complication during pregnancy were taken as controls. Maternal data were documented with respect to age, parity, socioeconomic status, whether urban or rural, status of antenatal care, gestational age at delivery and mode of delivery. Total number of deliveries during this study period was 1,103. Out of them babies born to PIH are 77 (6.98%). (Table 1). IUD in babies born to PIH mothers are 14. PIH with twin pregnancy are 5.

Table 1: The total number of deliveries and incidence of PIH during the study period.

Total number of deliveries	1103	100%
Babies born to PIH Mothers	77	6.98 %
IUD in PIH	14	1.2%
PIH in twin Pregnancy	5	0.4%

Table 2: The neonatal outcomes in case group and controlled group.

		Cases (%) (Total no of cases 58)	Controls (Total no of cases 100)
Type of delivery	Normal delivery	04 (6.9%)	14 (14%)
	Caesarean surgery	54 (93.1%)	86 (86%)
Birth weight	Low birth weight	33 (57%)	18 (18%)
	Not low birth weight	25 (43%)	82 (82%)
Gestational age	Pre-term	25 (43.1%)	17 (17%)
	Term	33 (56.9%)	83 (83%)
Apgar score	>8	56 (96.5%)	96 (96%)
	<8	02 (3.5%)	04 (04%)
NICU admission	Admission	33 (57%)	35 (35%)
	No admission	25 (43%)	65 (65%)
Hyaline membrane disease	Present	02 (3.4%)	01 (1%)
	Absent	56 (56.6%)	99 (99%)
Meconium aspiration syndrome	Present	01 (1.7%)	00
	Absent	57 (98.3%)	100 (100%)
Sepsis	Present	02 (3.4%)	01 (1%)
	Absent	56 (96.6%)	99 (99%)
TTNB	Present	03 (5.1%)	02 (2%)
	Absent	55 (94.9%)	98 (98%)
IUGR	Present	11 (18.96%)	05 (5%)
	Absent	47 (81.04%)	95 (95%)

Relevant maternal investigations were also obtained. Neonatal outcome data were documented with respect to birth weight, asphyxia and its degree, gestational age, NICU admissions, early neonatal complications, and early neonatal death rate.

The data was recorded on a predesigned proforma tabulated and analyzed statistically (Table 2).

Mode of delivery

Out of 58 cases 04 had normal vaginal delivery, 54 delivered by LSCS. In 100 controls 14 had LSCS while 86 had normal vaginal delivery that is 93.10% of the cases and 86% of the controls had undergone LSCS.

Birth weight

Out of 58 cases 33 had low birth weight and in 100 controls 18 had low birth weight babies.

Among 56.89% of the cases and 18% of the controls had Low Birth Weight (LBW) babies.

Gestational age (GA)

Out of 58 cases 25 had preterm deliveries with GA <37 completed weeks and in 100 controls 17 had GA <37 completed weeks.

In PIH case there were more preterm deliveries 43.10% of the babies in cases, compared to 17% in control group.

APGAR score

Among 2 of 58 babies in cases group have APGAR less than 8 at 5min where as in controls 4 of 100 babies had APGAR less than 8. 3.4% of babies in cases group and 4% babies in control group had APGAR score <8.

NICU admission

Among 33 of the 58 in case group have been admitted in NICU. Where as in control group 35 of the 100 have been admitted. In case group there were 56.89% NICU admissions where as in control group there were 35% NICU admission.

Hyaline membrane disease (HMD)

Risk of HMD in PIH case is 3.44% where as in control group it is 1%.

Meconium Aspiration Syndrome (MAS)

Out of 58 cases 1 baby had MAS where as in controls no baby had MAS. In PIH cases is 1.70% had MAS.

Sepsis

Of the 58 cases 2 babies had sepsis whereas in controls 1 baby of 100 had sepsis risk of sepsis in PIH cases is 3.4% where as in control group it is 1.0%.

Transient Tachypnoea of New Born (TTNB)

Among 5.17% of the cases had TTNB where as in controls there is 2% TTNB

Intra uterine growth retardation

This study showed that 11 out of 58 (18.9%) infants born to PIH mothers had Intra uterine Growth Retardation while in infants born to normotensive mothers the rate was only 5% which is statistically very significant p Value of 0.005 which indicates that PIH is significantly associated with Intrauterine Growth Retardation.

DISCUSSION

A hospital based prospective observational study was conducted in department of Pediatrics of tertiary care teaching hospital in North Telangana. during January 2018 to October, 2019. The aim of the study was to assess the early neonatal in babies born to PIH mothers. Sample size of 58 babies born to PIH mothers selected using consecutive sampling technique.

Total number of deliveries during our study period was 1,103. Out of them babies born to PIH are 77 (6.98%). (Table 1). IUD in babies born to PIH mothers are 14. PIH with twin pregnancy are 5.

This study showed that there is increased risk of Caesarean Section, Low Birth Weight, Preterm Delivery, NICU admission, birth asphyxia and Intra Uterine Growth Retardation in PIH cases compared to Controls. However, the risk of LBW, Preterm Delivery, NICU admissions and IUGR is significant.

In this study 93.10% of PIH cases have been delivered by caesarean surgery. It is high when compared to controls (86%) and there is no significant difference in the mode of delivery in the study population who has PIH when compared to control group. In some cases, the indication of LSCS was PIH alone, while in some other cofactor is the indication for LSCS. In few cases PIH was not a indication of LSCS because of its mildness the indication being other obstetric complication like CPD and previous LSCS etc. The high rate of caesarean surgeries in our study may be due to our institute being the tertiary referral Centre dealing with large number of complicated pregnancies.

In similar other studies, caesarean delivery rates are significantly high in PIH group compared to controls. In study by Gofan EN et al cesarean delivery rate is double compared to controls.⁸ However, our study showed though there is increased risk of cesarean delivery in cases group it was not statically significant. This study yielded similar results and was comparable to many other studies.⁹⁻¹¹

Among 43.10% of babies in PIH group are preterm and in control group 17.0% are preterm. Preterm babies are significantly higher in cases compared to controls. The higher incidence of preterm deliveries in PIH group was both because of spontaneous onset of preterm delivery and iatrogenic termination. This study resulted in similar findings as rates observed in some other studies like Yadav S et al, reported a 28.85%, Solangeregina et al reported 10.9% and Bangal VB et al of about 37% of preterm deliveries.^{10,12,13}

Among 3.44% of babies in PIH group had APGAR score less than 8 compared to 4% in control group. This is not significantly different in both the groups. In similar other study by Chang JJ et al, showed that there is no significant difference between cases and controls.¹⁴

In the present study there were higher NICU admission rates in babies born to PIH mothers when compared to controls, 56.8% in PIH group and 35.4% in control group had NICU admissions. The p value is less than 0.05. Higher rate of NICU admission in cases group compared to controls is significant. Masoura et al also showed there were significantly high NICU admissions.¹⁵ Jehan Ara et al showed 42% NICU admission rate and Halil Aslan et al showed that need for NICU admission rate is greater in severe preeclampsia.^{16,17}

This study showed 3.44% of babies born to PIH mothers had HMD whereas in control group it is 1%. Nadkarni et al study showed it is 7.3% in case group.⁹ A study by Carvatha et al there is same probability of HMD in newborn of normotensive and PIH mothers.¹⁸ The increased risk of HMD in PIH group may be mostly due to increased risk of preterm deliveries. In our study it was not statistically significant.

In the 58 babies born to PIH mothers 1 baby are admitted in NICU with MAS whereas in 100 controls no babies had MAS. MAS incidence in case group is 1.71% whereas MAS incidence in control group is 0%. this was not statistically significant. Anand S et al study showed incidence of MAS is 5.4% 2 of the 58 babies born to PIH mothers admitted to NICU with sepsis whereas in controls 1 out of hundred controls had sepsis. 3.41% in cases group had sepsis. Sepsis rates are not statistically significant. Nadkarni et al study showed it is 7.5% in case group.¹⁹ Bhaumik et al found an increased risk, though not statistically significant ($p > 0.10$) of early onset sepsis in babies born to pre-eclamptic mothers.²⁰

In this study the percentage of IUGR in babies born to PIH mother is 18.96%, while 5% babies are IUGR in control group it is statistically significant Zafar H et al, Fifty patients of PIH were selected for the study. They found that 28% out of them proved to have IUGR. this study was comparable and had shown similar results.²¹

No babies born to PIH mothers died in first week of life, whereas no baby died in control group in this study. Study by Solangeregina et al showed 0.8% early neonatal deaths.¹⁰ In a similar study by Wolde Z et al, comparing early neonatal death in babies born to women with hypertensive disorders of pregnancy yielded neonatal deaths of 9% and 9.88% respectively which is in contrast to our findings.²²

Among 5.12% of babies born to PIH mother suffered with TTNB, while 2.0% of the babies suffered in control group. Few studies have shown that late-preterm infants are at increased risk of transient tachypnea of the newborn (TTNB) term infants.^{23,24} No baby in case group had cyanosis at birth and diagnosed to have cyanotic congenital heart disease. As p value > 0.05 it is statistically not significant.

Limitation of this study was to the present study is tertiary hospital-based study, so cannot be applied to the general population as there is a chance of selection and referral bias., May need prolonged follow up, Small sample size may need further studies.

CONCLUSION

PIH is the one of the major causes of maternal, fetal and early neonatal morbidity and mortality. Chronic uteroplacental insufficiency results in ante or intrapartum anoxia that leads to fetal compromise There is increased risk of caesarean surgery, LBW, preterm delivery, NICU admission, birth asphyxia, TTNB, HMD, sepsis, early neonatal deaths in babies born to PIH mothers. In this study we found that risk of LBW, preterm delivery, NICU admission and IUGR in babies born to PIH mothers statistically significant. In all pregnant women with PIH even with regular antenatal care the increased risk of caesarean delivery and early neonatal complications should be anticipated.

Early detection of high-risk individual by well trained personnel and timely referral to advanced tertiary centres is necessary in bringing down the maternal and neonatal morbidity and mortality.

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