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STUDY OF EARLY NEONATAL OUTCOME IN BABIES BORN TO PIH MOTHERS

Paediatrics

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ABSTRACT

Background: The perinatal mortality in pre-eclampsia in developed countries ranges between 7-10% and in developing countries it is about 20%. Diastolic blood pressure >95mmhg is associated with 3 fold increased 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%. This article provides a systematic evaluation of the current state of knowledge in this area.

Aim: To compare the mode of delivery between control group and PIH group and compare the difference in the outcome between PIH group and control group such as gestational age, birth weight of new born.

Materials and Methods: The study was conducted in a teaching hospital in Telangana State, India over a period of 6 months from June 2018 to December 2018. All pregnant women coming to antenatal outpatient were screened for PIH by measuring blood pressure, if initial BP was high or >140/90 mmHg 2nd reading was taken after 4 hrs and if BP persisted to be and found >140/90mmHg, labeled as PIH and included in study as PIH group. Total no of cases -75 and Total no of controls -100. At the time of delivery mode of delivery noted. Babies were weighed immediately after birth and on 2nd day of life. Gestational age assessment was done within 12hrs of life by New Ballard Scoring. The data was recorded on a predesigned proforma tabulated and analyzed statistically.

Results: Out of 75 cases 22 had normal vaginal delivery, 53 delivered by LSCS. In 100 controls 27 had LSCS while 73 had normal vaginal delivery. i.e. 70.67% of the cases and 27% of the controls had undergone LSCS. Out of 75 cases 41 had low birth weight and in 100 controls 23 had low birth weight babies. In PIH cases there were more preterm deliveries. 63.01% (n=46) of the babies in cases are preterm compared to 23.23% (n=23) in control group.

Conclusion: Pregnancy-induced hypertension (PIH) is the development of new hypertension (systolic above 140 or diastolic above 90 mmHg) in a pregnant woman after 20 weeks of gestation. It is one of the most common causes of death due to pregnancy. Pre-eclampsia usually occurs after 32 weeks; however, if it occurs earlier it is associated with worse outcomes. Complications of PIH can affect both the mother and the fetus. Our study is prospective observational study and shows PIH is associated with increased frequency of Caesarean Section, preterm delivery, and low birth weight babies.

KEYWORDS

Pregnancy induced hypertension (PIH), Gestational hypertension, Pre- eclampsia, Eclampsia, Caesarean Section, Preterm, Low birth weight (LBW).

INTRODUCTION

The word eclampsia is from the Greek term for lightning[87]. The first known description of the condition was by Hippocrates in the 5th century BC[87]. Pregnancy induced hypertension is one of the common complications met with in pregnancy and contributes significantly to maternal and perinatal morbidity and mortality. PIH is divided in to three types

1. Gestational Hypertension.
2. Pre-eclampsia
3. Eclampsia

Gestational Hypertension is defined as a sustained systolic blood pressure of at least 140 mm Hg or sustained diastolic blood pressure of at least 90 mm Hg or rise in systolic BP>/equal to 25 mm Hg, diastolic BP>/15mmhg. [Two reading taken 4 hrs apart].

Pre - eclampsia is Development of hypertension after 20 weeks gestation in a woman with no known history of hypertension or renal disease and whose blood pressure was normal in first half of pregnancy and returned to normal after delivery. And often a significant amount of protein in the urine.

- Mild Pre eclampsia - Hypertension only.
- Severe pre eclampsia - Hypertension and evidence of organ dysfunction.

Eclampsia is defined as convulsions and/or coma not caused by coincidental neurologic disease which occurs during pregnancy or puerperium in a woman whose condition also meets the criteria for pre-eclampsia.

The precise etiology of PIH remains unknown. There are many risk factors[20]

1. Abnormal trophoblast proliferation
2. Coagulation abnormalities
3. Vascular endothelial damage
4. Cardiovascular maladaptation
5. Immunological phenomenon
6. Genetic predisposition
7. Dietary deficiency or excesses

Our primary aim is to compare the mode of delivery between control group and PIH group and to compare the difference in outcome between PIH group and control group such as gestational age, birth weight of new born.

Review of Literature

In India the incidence of pre-eclampsia 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].

1. According to Ducey[24] hypertensive pregnant women with normal umbilical and uterine velocimetry have fetal outcome that are similar to those normal women. Patients with abnormal umbilical and uterine waveforms have poor outcome.
2. Friedman and Neff[28] conducted a 13 year prospective study over 38000 pregnancies, analyzed and concluded that hypertension alone defined by diastolic BP of 95mm Hg or greater was associated with a 3 fold increase in fetal death rate. Worsening hypertension especially if associated with proteinuria was more significant.
3. Naeye and Friedman [1979] concluded that 70% of excess fetal deaths in these same women were due to large placental infarcts markedly small size of placenta and abruption placenta. These microscopic placental lesions resulted from reduced uteroplacental perfusion[28].
4. The combination of proteinuria and hypertension during pregnancy markedly increased the risk of perinatal mortality and morbidity [Ferrajani &associates}. [27]
5. Banoo S et al[7] study reported overall fetal mortality was 10% including 20% from patients with HELLP syndrome and 9.7% from those without HELLP syndrome. – {2007}.
6. Luo. Zhong et al 2006[46] gave following statistics I. Preterm

deliveries -17.4% II. IUGR-7.4% III. Low 5 minute APGAR-2.6% IV. Neonatal deaths-1.9%

7. Kaur et al [2003][40]- HELLP syndrome-66.7%, Moderate PIH-3.0%, Severe PIH-21.33%.
8. Yadav S et al[84] concluded that in PIH a. Preterm delivery -28.8% b. Still births 4.8% c. Perinatal mortality-14.8% d. NICU admissions-40%.
9. Gupta et al -1996[32] -Perinatal mortality- 14%.
10. Zarien study -2004[86] --Perinatal mortality-5.4%.
11. Das Lucy et al -2005[22] -Still birth rate -33.8%.
12. Bansal V[78] -1998 Found following complications in eclampsia Prematurity-69% Birth asphyxia-13.9%.
13. Gokhroo et al [2001][31] -reported that incidence of MSL in PIH cases was higher at 13.18%.
14. Sibai [1987][64] found that neonatal complications in eclampsia were related to prematurity and unrelated to maternal eclamptic process. There were no difference between premature babies of eclampsia & premature babies of control population Long term follow up data up to 4 years of age seems favorable according to Sibai 1983 study.

Currently, the clinical value of an accurate predictive test for pre-eclampsia is not clear, as effective prevention is still lacking. Intensive monitoring in women, who are at increased risk for developing pre-eclampsia, when identified by a predictive test, may lower the incidence of adverse outcome for the mother and the neonate. However, the effectiveness of such a strategy must be rigorously investigated.

MATERIALS AND METHODS

The study was conducted in a teaching hospital in Telangana state, India over a period of 6 months from June 2018 to December 2018.

The study sample comprised 75 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 full term normal pregnancy and without any complication during pregnancy were taken as controls.

INCLUSION CRITERIA

1. Regular antenatal care
2. Singleton fetus
3. Three or more antenatal visits
4. Age of mother 18 -36 yrs.

Pregnant women with no known medical or surgical illness with regular antenatal care coming for institutional delivery will be taken as controls.

Exclusion Criteria

Those mothers who were unregistered and has other medical and obstetric problems, chronic medical problems like diabetes, chronic renal failure, chronic hypertension, cardiac disease polyhydramnios multiple pregnancy anemia, maternal age >36 yrs and <18 yrs are excluded from study.

Before commencing the study the institutional Ethics Committee clearance was taken. Informed consent from each and every mother enrolled in this study and from parent, husband, and guardian was also obtained.

Funding: None

Study procedure: This is prospective observational study. 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. Relevant maternal investigations were also obtained. Fetal outcome data were documented with respect to birth weight, still birth rate, 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. Chi-square test was used to test the association of columns and rows in table data. When the variables are less than 10, Yates correction was used. A p value of less than 0.05 was considered significant. Total no of cases -75, Total no of controls -100.

All pregnant women coming to antenatal outpatient were screened for PIH by measuring blood pressure, if initial BP was high or >140/90 mmHg 2nd reading taken after 4 hrs and if BP persisted to be and found >140/90mmHg, labeled as PIH and included in study as PIH group. These women were monitored regularly and if found to have other medical or obstetric complications they were excluded from study. All the mothers were given regular antenatal care they were followed till delivery and categorized as mild and severe PIH as per definition. These mothers were monitored on regular day to day the drugs were given to treat complications. At the time of delivery mode of delivery noted. If the baby had any complications such babies shifted to NICU.

Babies were weighed immediately after birth and on 2nd day of life, other measurements were taken at 24 hrs of life. The length was measured on infantometer. Head circumference was measured with a non stretchable tape. All measurements were taken by same clinician. Gestational age assessment was done within 12hrs of life by new Ballard scoring and gestational age according to last menstrual period was calculated. The new borns were classified by comparing their gestational ages employing intra uterine growth curves of Indian standard by means of percentiles. This had allowed them for classifying them as

Appropriate for gestational age AGA: 10th -90th percentiles
Small for gestational age SGA: <10th percentile
Large for gestational age LGA: >90th percentile

The babies who were normal without any complications at birth like prematurity, VLBW, birth asphyxia, MSL, RDS will be discharged along with mother , those who had any complication will be noted and as previously said were admitted in NICU. All babies will be monitored up to 7th day of life and if death occurred will be noted and cause of death noted.

RESULTS

The data was recorded on a predesigned proforma tabulated and analyzed statistically. Chi-square test was used to test the association of columns and rows in table data. Total no of cases -75. Total no of controls -100.

Comparison of Out Comes Between Cases and Controls

Mode of Delivery: Out of 75 cases 22 had normal vaginal delivery, 53 delivered by LSCS. In 100 controls 27 had LSCS while 73 had normal vaginal delivery. [Table.1] i.e. 70.67% of the cases and 27% of the controls had undergone LSCS.

Table.1 Mode of Delivery

Type of Delivery	Cases (n=75)	Controls (n=100)
Normal Delivery	22	73
Caesarean Surgery	53	27

Chi-Square value 32.93 p -value- 0.0000001 [less than 0.05]. Delivery by LSCS is significantly high in cases compared to controls. [Fig.1]

- **Birth Weight**: Out of 75 cases 41 had low birth weight and in 100 controls 23 had low birth weight babies. [Table.2]

Table.2: Birth Weight

Birth Weight	Cases (n=75)	Controls (n=100)
Low birth weight (<2.5kg)	41	23
Not Low birth weight	34	77

54.67% of the cases and 23%of the controls had LBW babies. Chi-Square value-18.527.
p -value- 0.000016.

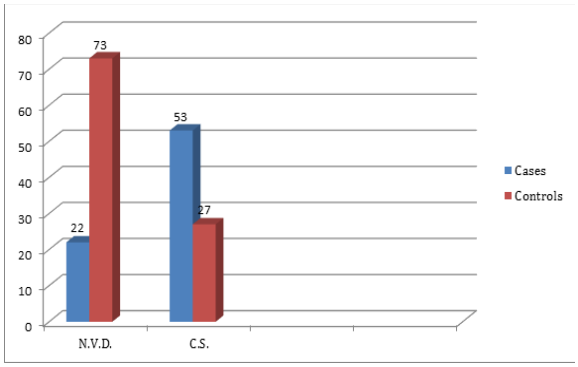

Fig.1

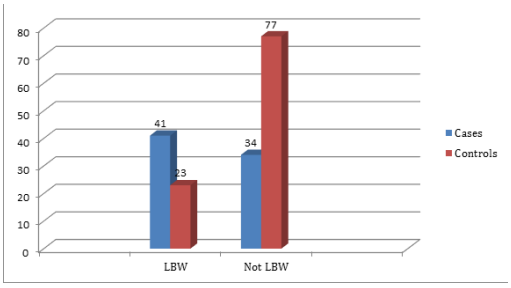

Fig.2: LBW is significantly high in cases compared to controls. [Fig.2]

- **Gestational Age:** In PIH cases there were more preterm deliveries. 63.01% (n=46) of the babies in cases are preterm compared to 23.23% (n=23) in control group. [Table.3]

Table.3: Gestational Age

Gestational age	Cases (n=73)	Controls (n=99)
Preterm	46	23
Term	27	76

Gestational Age of Babies Born To PIH Mother

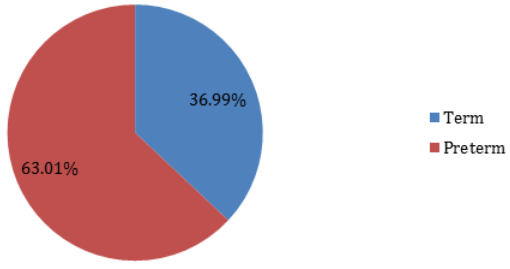

Fig.3

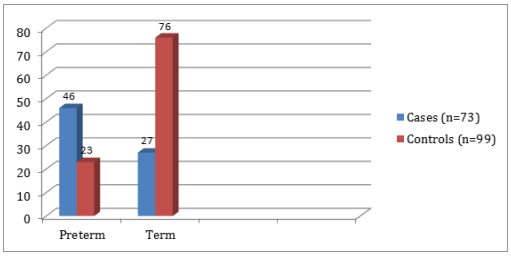

Fig.4: Chi-Square value-27.680, p –value-0.000000143. Preterm babies are significantly high incases compared to controls. [Fig.3 & 4]

DISCUSSION

Pregnancy induced hypertension is one of the common maternal conditions which can affect fetal and neonatal outcome. This study showed that there is increased risk of Cesarean surgery, low birth weight, preterm delivery.

In our study 70.67% of PIH cases have been delivered by Cesarean surgery. It is significantly high when compared to controls. In some cases the indication of LSCS was PIH alone, while in some other cofactor is the indication for LSCS. In some cases PIH was not a indication of LSCS because of its mildness the indication being other obstetric complication like CPD etc. In similar other studies also Cesarean delivery rates are significantly high in PIH group compared to controls.

In study by Goftan EN etal30 Cesarean delivery rate is double compared to controls.

The incidence of Cesarean surgeries in other studies like

1. Solange Regina et al[70] -67%
2. Aleem Arshad, Rawalpindi[1] -55%
3. Yücesoy G; Ozkan[85]- 48.2%
4. Nadakarni J Bahl, Parekh[53] -39.4%
5. Jarassolu Fatemah[26]- 39.4%
6. Onyinuka AN et al-35.7%
7. XuXiongetal[83] -17.1%
8. Yadav S, Saxena[84] -14.8%

54.6% of the babies in PIH group are low birth weight, it is significantly high when compared to control group. Significantly low birth weight in PIH group may be due to chronic placental insufficiency.

Similar other studies also show increased risk of LBW in PIH mothers like

1. Nadkarni[53] -51.7%
2. Solangi Regina et al[70] -19%
3. Aleem Arshad1 -11.29%
4. Xu Xiong[83] -7%

63.01% of babies in PIH group are preterm and in control group 23.23% 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. Similar rates have been observed in some other studies like Jehan era et al -61%, and NICE study-50%.

In most of studies preterm delivery is significantly high compared to control groups like

1. Yadav S et al[84] -28.85%
2. Solange Regina et al[70] -10.9%

Merits and Demerits: This study was done in a teaching hospital which is well equipped under the guidance of senior obstetricians. Faculty from other departments like General Medicine, General Surgery were involved whenever required. There are plenty of cases and good number of patients for study. Recording of blood pressure for mothers and anthropometry for new borns were done by pediatricians accurately. Faculty from Preventive and Social Medicine were involved in doing calculations, data collection and statistical work. This study is showing the results which are comparable with other studies.

However, this study was conducted upon patients, who were attending to our hospital. Thus our findings may not represent the exact picture in the population. The high rate of Cesarean surgeries in our study may be due to our institute is the tertiary referral centre dealing with large number of severe PIH cases. Indication for LSCS may be other obstetric complication like CPD etc. Other complications like perinatal asphyxia, meconium aspiration syndrome, sepsis, Hyaline membrane disease, neonatal death etc. were not included in this study.

Recommendations: Worldwide, preeclampsia and eclampsia are estimated to be responsible for approximately 14% of maternal deaths per year (50,000-75,000).[82] Morbidity and mortality in pre-eclampsia and eclampsia are related to the following conditions:

- Systemic endothelial dysfunction
- Vasospasm and small-vessel thrombosis leading to tissue and organ ischemia
- CNS events, such as seizures, strokes, and hemorrhage
- Acute tubular necrosis
- Coagulopathies
- Placental abruption in the mother

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 haemorrhage 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

Conservative management of mild pre eclampsia generally includes hospitalization with bed rest and close maternal and fetal observation. Outpatient management is an option only for the few carefully selected, well supported and reliable patients after a period of initial observation to assess maternal and fetal status. All patients with severe PIH should be shifted to tertiary centre for intensive monitoring and management.

In selected patients with severe PIH between 24 and 34 weeks, delivery may be postponed for 48-72 hrs for the purpose of giving the mother steroids and to prevent neonatal RDS and IVH. Additional prolongation of pregnancy is dangerous for the mother and should be undertaken exclusively in tertiary care centers.

Results from the Norwegian Mother and Child Cohort Study suggest that supplementation of milk-based probiotics may reduce the risk of pre eclampsia in primiparous women. A prospective randomized trial has not yet been done to evaluate this intervention.[11] A study by Vadillo-Ortega et al suggests that in a high-risk population, supplementation during pregnancy with a special food (eg; bars) containing L-arginine and antioxidant vitamins may reduce the risk of preeclampsia. However, antioxidant vitamins alone do not protect against pre-eclampsia. More studies performed on low-risk populations are needed.[75]

CONCLUSION

PIH is one of the common complications met with in pregnant women which develops as a direct result of gravid state and hence remits after delivery. 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 Cesarean surgery, LBW, preterm delivery, in babies born to PIH mothers. In all pregnant women with PIH even with regular antenatal care the increased risk of Cesarean delivery and early neonatal complications should be anticipated. All pregnant women with PIH should have regular antenatal care, and delivered in institution where appropriate neonatal care is available. Pre eclampsia 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.[47]

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