

Effect of pregnancy induced hypertension on maternal and fetal outcomes

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Abstract

Introduction: PIH complicates 6-10% of all pregnancies. It contributes mainly to maternal and fetal complications. Patients with PIH are at a greater risk of abruptio placenta, cerebrovascular events, organ failure and DIC. Fetuses are at a greater risk of IUGR, preterm birth, small for gestational age and IUD.

Materials and Methods: 250 patients with PIH were studied. Pregnant women with 90mm hg or more with or without proteinuria diagnosed after 20 weeks were included. A predesigned semi-structured questionnaire was prepared based on review of literature on PIH and its maternal & fetal outcomes.

Observation & Results: In this study, 6% cases were 18 years of age, 37% were 18-24 years, 44% were 25-28 years, 10% were 29-35 years and 3% more than 35 years. In the present study, 44% had edema and 56% had no edema. 42% had proteinuria out of which 66.7% had 1+, 23.3% had 2+ and 9.5% had 3+. 58% had no proteinuria. Normal vaginal delivery was seen in 56% cases, 10% had instrumental delivery among these 6% had forceps assisted and 20% had vacuum delivery. In this study, 8.8% required neonatal resuscitation, 91.2% did not require neonatal resuscitation. 10% of the neonates had NICU admission and 90% did not require any NICU admission.

Conclusion: Preterm birth and IUGR are the most commonly encountered perinatal outcomes in PIH. Low birth weight is the most common neonatal outcome. Proper ANC with early diagnosis of PIH could significantly reduce its perinatal, natal, and maternal outcomes in patients.

Keywords: PIH, IUGR, Preterm labour, HELLP syndrome.

Introduction

Pregnancy induced hypertension complicates 6 to 10% of all pregnancies and together they are one member of a deadly triad along with haemorrhage and infection that contributes greatly to maternal morbidity and mortality.¹ Among these, preeclampsia syndrome, either alone or superimposed on chronic Hypertension; is the most dangerous.

Basic classification of hypertensive disease in pregnancy include²

1. Gestational HTN – BP >140/90mmHg after 20 weeks in previously normotensive women.
2. Preeclampsia syndrome – Gestational HTN with proteinuria
3. Eclampsia syndrome – Women with preeclampsia, convulsion/ coma that cannot be attributed to another cause. Seizures are generalized and may appear before, during or after labour.
4. Preeclampsia superimposed on Chronic HTN – Chronic underlying HTN is diagnosed in women with documented BP> 140/90 mmHg before pregnancy or before 20 weeks gestation or both.

Risk factors for pregnancy induced hypertension:

1. Pre conceptional and or chronic risk factors

- a) Partner related risk factors
 - i. Nullipara/primi/teenage pregnancy³

- ii. Assisted reproductive techniques
- iii. Partner who fathered a preeclampsia in another woman
- b) Non-partner related risk factors
 - i. History of previous PIH⁴
 - ii. Polycystic ovary disease
 - iii. Age interval between pregnancies
 - iv. Family history
 - v. Low socio-economic class

2. Underlying disorders

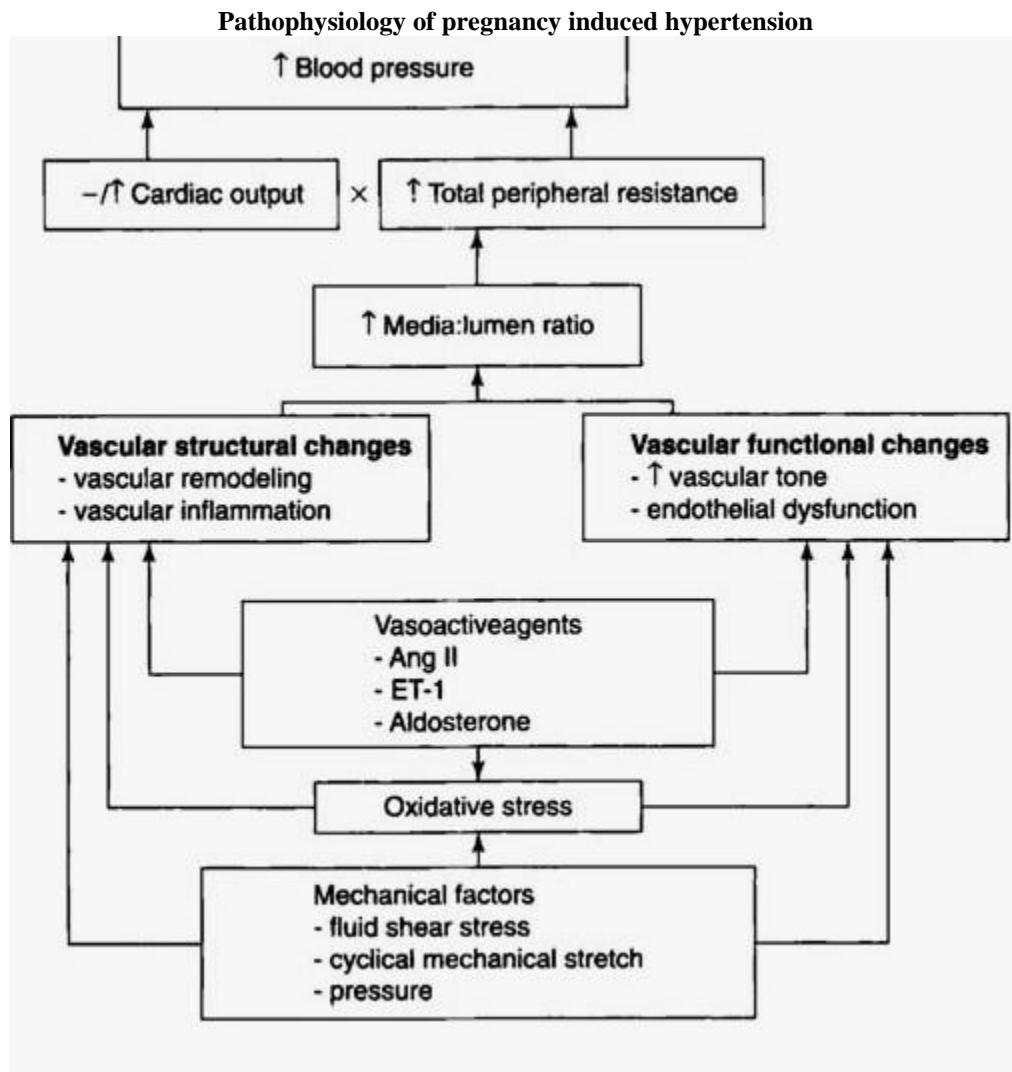
Chronic hypertension, renal disease, obesity, insulin resistance, low birth weight, gestational diabetes mellitus, protein C resistance, protein S deficiency, antiphospholipid antibody syndrome, hyperhomocystenemia and sickle cell disease.

3. Exogenous factors

- i. Smoking
- ii. Steroids
- iii. In utero DES exposure

4. Pregnancy associated risk factors

- i. Multiple pregnancies
- ii. Structural anomalies
- iii. Gestational trophoblastic diseases
- iv. Urinary tract infection
- v. Chromosomal anomalies (trisomy 13, triploidy)



Maternal complications

HELLP syndrome, temporary blindness, abruptio placentae, disseminated intravascular coagulation (DIC), acute renal failure (ARF), pulmonary oedema, arrhythmias, liver lesions, intracranial or hepatic haemorrhage, adult respiratory distress syndrome (ARDS), hypervolemia and risk of recurrent preeclampsia

Foetal complications

Intrauterine growth retardation, preterm birth, small for gestational age and foetal death.

1. HELLP syndrome

HELLP syndrome i.e., haemolysis, elevated liver enzymes and low platelet count is a form of severe preeclampsia with high rates of neonatal and maternal morbidity. It occurs in 5 to 10% of patients with hypertension in pregnancy. HELLP syndrome was defined by the presence of all the three following criteria: haemolysis (characteristic peripheral blood smear),

serum lactate dehydrogenase ≥ 600 U/l, total serum bilirubin ≥ 1.2 mg/ml, elevated liver enzymes (serum aspartate aminotransferase ≥ 70 U/l) and low platelet count ($<100,000/\mu\text{l}$). Partial HELLP syndrome (PHS) is defined by the presence of one or two features of HELLP syndrome but not the complete syndrome.⁵

- a. A clinical study conducted in China to describe the outcomes and characteristics of the obstetric patients with concurrent eclampsia and HELLP syndrome revealed that maternal death rate was 35% and significantly higher than the rate in eclampsia without HELLP syndrome (3%). There were more patients complicated with cerebral venous thrombosis and cerebral haemorrhage in eclampsia with HELLP syndrome group.⁶
- b. A study conducted on hypertensive disorders in pregnancy, confirmed HELLP syndrome as a severe form of pre-eclampsia, associated with high rates of neonatal and maternal morbidity.⁷

2. Blindness

Rarely, temporary blindness may accompany severe preeclampsia and eclampsia which may last a few hours to a week.⁸ There are few cases reported of blindness lasting longer than 2 months.

3. Abruptio placentae

It is a maternal complication in 10% of eclamptic patients particularly with antepartum eclampsia. A study conducted to evaluate the maternal and perinatal outcome following expectant management of early onset severe preeclampsia at a tertiary hospital in Mansoura, Egypt, concluded that HELLP syndrome, renal impairment, and placental abruption are the main complications.⁹

4. Disseminated intravascular coagulation (DIC)

It occurs in about 5% of patients. DIC may indicate a worsening of HELLP syndrome, a developing abruptio placentae or the first sign of sepsis. A study conducted in Turkey to determine the risk factors, prevalence, epidemiological parameters, and maternal-perinatal outcome in pregnant women with hypertensive disorder stated that, maternal mortality occurred in 3 cases (1.2%) which were complicated with HELLP syndrome. Intracranial bleeding was the cause of maternal death in one case while the other two cases were lost due to acute renal failure and disseminated intravascular coagulation, respectively.¹⁰

5. Acute renal failure (ARF)

Occurs usually due to acute tubular necrosis or bilateral cortical necrosis, rare complications, associated with DIC and abruptio placentae. It occurs in about 5% of eclamptic patients.

6. Cardiogenic pulmonary oedema

It is uncommon, occurring in about 3 to 4% of patients. It indicates severe hypertension in pregnancy. A study conducted to identify the risk factors of adverse pregnancy outcomes in expectant management of pregnant women with early onset severe pre-eclampsia (EOSP) stated that and HELLP syndrome, placental abruption, heart failure and pulmonary oedema as the main complications in adverse outcome group.¹¹

7. Haemorrhage

Any patient with clinical evidence of preeclampsia and right upper quadrant abdominal pain, particularly in presence of thrombocytopenia and elevated liver enzymes should be considered high risk for hepatic haemorrhage from sub capsular or intrahepatic hematoma (with or without rupture) associated with high maternal and foetal mortality. A study conducted in South Africa to learn the maternal deaths associated with hypertension, stated that cerebral complications as final cause of death in 45.5%.¹² A study conducted in the incidence of concurrent eclampsia and HELLP

syndrome, mortalities were more due to cerebral haemorrhage.¹³

8. Arrhythmias

Malignant ventricular arrhythmias not related to electrolyte imbalance, deranged acid base status or hypoxia has been described in patients with severe hypertension in pregnancy.

9. Intra uterine growth retardation

IUGR is defined as pathological decrease in the rate of foetal growth. Increased risk of IUGR in hypertensive pregnancies, particularly those associated with severe and early-onset pre-eclampsia. Multiparous with preeclampsia are at higher risk of IUGR than are nulliparous.

- A study conducted to assess the global impact of pre-eclampsia and eclampsia stated preeclampsia can result in the risk for the baby as poor growth and prematurity.¹⁴
- A study conducted to examine the association between PIH and perinatal mortality, concluded that intra uterine growth restriction secondary to PIH is associated with significantly increased perinatal mortality.¹⁵
- In an editorial on monitoring and outcome of PIH, pre-eclampsia and eclampsia, found that new born infants of mother with PIH, had intra uterine growth retardation, prematurity, dysmaturity and necrotizing enterocolitis. Also concluded that PIH is one of the major cause of maternal and fetal/neonatal morbidity and mortality.¹⁶
- A study conducted for clinical significance liver dysfunction in PIH stated hepatic dysfunction as one of the frequent manifestations of multisystem involvement in pre-eclampsia. Liver dysfunction was associated with intra uterine growth retardation and prematurity, and is an independent risk factor for maternal and perinatal complications.¹⁷
- In a study to analyse if preeclampsia, gestational hypertension and IUGR are related or independent conditions concluded that preeclampsia and gestational hypertension shared many risk factors. Conversely, preeclampsia and unexplained IUGR often assumed to be related to placental insufficiency seems to be an independent biological entity.¹⁸

10. Fetal death

PIH is one of the major causes of maternal and fetal/neonatal morbidity and mortality.

- In a study to determine the risk factors, prevalence, epidemiological parameters, and maternal-perinatal outcome in pregnant women with hypertensive disorder, found that 24 cases of intrauterine fetal demise out of 255 cases, and 10 fetuses died during

the intrapartum period. Perinatal mortality rate was found to be 144/1,000 births.¹⁹

- b. In a population based, retrospective, cohort study based on 16,936, intrauterine growth retardation secondary to pregnancy induced hypertension was associated with significantly increased perinatal mortality.²⁰

11. Recurrent hypertension in pregnancy

Risk of recurrent preeclampsia in the second pregnancy varies according to gestational age at delivery in the first pregnancy, with greatest risk to women who delivered earliest in previous pregnancy. Further risk increases with increasing birth interval, along with increasing maternal age, weight gain, change in paternity, or the development of chronic diseases.²¹

A study on 250 patients attending our ANC OPD was done with due consent to comment on the maternal and fetal outcomes in pregnancy induced hypertension

Table 1: Distribution according to presence of oedema

Oedema	Frequency	Percent
Present	110	44.0
Absent	140	56.0
Total	250	100.0

Table 2: Distribution according to presence of Proteinuria

Proteinuria	Frequency	Percent
Present	105	42.0
Absent	145	58.0
Total	250	100.0

Table 3: Past history of PIH according to type

Past history of PIH	Number of cases	Percent
Mild PIH	25	10.0
Moderate PIH	10	4.0
Severe PIH	5	2.0
Past history of Eclampsia	2	0.8
Past history of Chronic Hypertension	5	2.0

Tale 4: Mode of delivery

Mode of delivery	Frequency	Percentage
Vaginal delivery	140	56
Instrumental delivery	25	10
-forceps	10	4
-vacuum	15	6

LSCS	85	34
-emergency	50	20
-elective	35	14
Total	250	100

Table 5: Obstetric outcome of cases

Obstetric Outcome	No.	Percent
Preterm labour	45	18.0
PROM	5	2.0
Abruption	3	1.2
IUGR	10	4.0
IUD	2	0.8
PPH	2	0.8
HELLP syndrome	2	0.8
DIC	2	0.8

Table 6: Distribution of cases according to birthweight

Birth weight	No. of cases (PIH cases)	Percent
1.5-2 kg	35	14.0
2-2.5 kg	60	24.0
2.5-3 kg	105	42.0
More than 3 kg	50	20.0
Total	250	100.0

Table 7: Distribution of cases according to need for NICU admission

NICU admission	No.	Percent
Present	25	10.0
Absent	225	90.0
Total	250	100.0

Discussion

The most common medical entity faced in pregnant women is hypertension, and it causes significantly adverse maternal and foetal outcomes.²² It affects about 10% of all pregnancies.²³ Pregnancies complicated by hypertension are associated with increased risk of antagonistic foetal, neonatal, and maternal consequences, comprising of intrauterine growth restriction, preterm birth, post or antepartum haemorrhage, acute renal and hepatic failure and lastly maternal and perinatal death.²⁴

Hypertensive circumstances of pregnancy can categorised as follows – a division is made at about 20 weeks of gestation. The women who are hypertensive prior to 20 weeks are said to have chronic or pre-existing hypertension in the absence any other pathology unrelated to pregnancy. Primigravida are at an increased risk for PIH. It can follow in the subsequent pregnancies. Age is a cardinal factor in PIH (Women more than Age of 40 years and teenagers). Most commonly observed PIH progresses during the second half of pregnancy typically after the 20th week. PIH found the advance at

the time of delivery or right after the patient has delivered.

In this study, we observed that 20 (8.0%) cases had positive past history of PIH in mother and 15 (6.0%) cases had a positive past history of PIH in sister. I also observed in my study that 25 (10.0%) cases had mild PIH, 10 (4.0%) cases had moderate PIH, 5 (2.0%) cases had severe PIH, 2 (0.8%) cases had past history of eclampsia and 5 (2.0%) cases had past history of chronic hypertension

In this study, mean systolic b.p level in PIH was 150.4 +/- 15.4 mmHg and mean diastolic b.p level in PIH cases was 97.8 +/- 9.60 mmHg. Urmila Singh,²⁵ stated that mean systolic b.p level was 111.18 +/- 8.03 mmHg and mean diastolic b.p level was 81.34 +/- 9.21 mmHg. P. Josephine Latha et al,²⁴ stated that mean systolic b.p level was 141.28 +/- 3.69 mmHg and mean diastolic b.p level was 93.8 +/- 5.47 mmHg. A study conducted by NAF Islam,²⁶ mean systolic b.p level 159 +/- 18.47 mmHg and mean diastolic b.p level was 100.75 +/- 10.92 mmHg.

In this study, we observed that mean fasting blood sugar level was 98.80 +/- 14.40 mg/dl. P. Josephine Latha et al,²⁴ stated that mean fasting blood sugar level to be 85.34 +/- 13.48 mg/dl.

In this study mean serum uric acid level was 4.70 +/- 0.52 mg/dl. P. Josephine Latha et al,²⁴ stated mean uric acid level to be 5.008 +/- 2.03 mg/dl

In pregnancies complicated by hypertension there is an increased risk of antagonistic foetal, neonatal and maternal consequences mainly comprising of intrauterine growth restriction, preterm birth, antepartum and post-partum haemorrhage, acute renal and hepatic failure and lastly maternal and perinatal death.

We observed that, 15 (6.0%) cases were less than 18 years of age, 93 (37.0%) cases were between 18-24 years of age, 110 (44.0%) cases were between 25-28 years of age, 25 (10.0%) cases were between 29-35 years of age and 7 (3.0%) cases were between 35 years of age and above. It was seen that mean age in PIH cases was found to be 24.40 +/- 3.3 years of age.

We observed that, 165 (66.0%) cases were primigravida, 45 (18.0%) cases were Para 2, 30 (12.0%) cases were Para 3, 10 (4.0%) cases were Para 4.

We observed that, 45 (18.0%) cases had previous abortion while 205 (82.0%) cases did not have the history of previous abortions.

In my study, we observed that 28 (62.2%) cases had single previous abortion, 12 (26.7%) cases had two previous abortion and 5 (11.1%) cases had three previous abortions.

We observed that, 25 (10.0%) cases had Mild PIH, 10 (4.0%) cases had Moderate PIH, 5 (2.0%) cases had Severe PIH, 2 (0.8%) cases had Past history of Eclampsia and 5 (2.0%) cases had Past history of Chronic Hypertension.

We found that 23 (9.2%) cases had Diabetes Mellitus, 60 (24.0%) cases had Hypertension, 10 (4.0%)

cases had Tuberculosis and 157 (62.8%) cases had no significant past history.

We also found that 20 (8.0%) cases had positive Past history of PIH in mother and 15 (6.0%) cases positive Past history of PIH in sister.

We observed that, 20 (8.0%) cases had addiction of chewable tobacco, 5 (2.0%) cases had Misri (dental tobacco), 5 (2.0%) cases had alcohol and 220 (88.0%) cases had no significant past history.

We also observed that, 110 (44.0%) cases had oedema while 140 (56.0%) cases did not have oedema. It was observed that 105 (42.0%) cases had proteinuria while 145 (58.0%) cases did not have proteinuria. It was observed that 70 (66.7%) cases had +1 proteinuria, 25 (23.8%) cases had +2 proteinuria and 10 (9.5%) cases had +3 proteinuria.

We observed that, 160 (64.0%) cases had Mild PIH, 70 (28.0%) cases had Moderate PIH and 20 (8.0%) cases had Severe PIH. It was observed that 80 (32.0%) cases had Preeclampsia, 15 (6.0%) cases had Eclampsia and 10 (4.0%) cases had Preeclampsia superimposed on Chronic hypertension and rest 145 (58.0%) were Gestational hypertension.

We also observed that, among PIH cases, 140 (56.0%) cases had vaginal delivery, 25 (10.0%) cases had instrumental delivery and 85 (34.0%) cases had LSCS. Among the instrumental delivery 10 (4.0%) cases had forceps delivery and 15 (6.0%) cases had vacuum delivery while among the LSCS cases, 50 (20.0%) cases had emergency LSCS and 35 (14.0%) cases had elective LSCS.

We observed that, mean Cholesterol level in PIH cases was 204.8 ± 10.56 mg/dl, mean HDL level in PIH cases was 39.36 ± 5.20 mg/dl, mean LDL level in PIH cases was 144.5 ± 11.2 mg/dl, mean VLDL level in PIH cases was 53.20 ± 5.40 mg/dl and mean Triglyceride level in PIH cases was 196.56 ± 12.8 mg/dl.

We found that, mean FBS level in PIH cases was 98.80 ± 14.40 mg/dl, mean systolic BP level in PIH cases was 150.4 ± 15.4 mmHg, mean diastolic BP level in PIH cases was 97.8 ± 9.60 mmHg, mean S. Uric acid level in PIH cases was 4.70 ± 0.52 mg/dl, mean Haemoglobin level in PIH cases was 9.6 ± 1.6 g/dl.

Among PIH group, 45 cases had Preterm labour, 5 cases had PROM, 10 cases had IUGR, 3 cases had Abruptio, and 2 cases each had IUD, PPH, HELLP syndrome and DIC.

We observed that, that 35 (14.0%) cases had birth weight 1.5-2 kg, 60 (24.0%) cases had birth weight 2-2.5 kg, 105 (42.0%) cases had birth weight 2.5-3 kg, 50 (20.0%) cases had birth weight more than 3 kg.

We observed that, 25 (10.0%) cases had placental weight of 250-300 grams, 70 (28.0%) cases had placental weight of 301-350 grams, 85 (34.0%) cases had placental weight of 351-400 grams, 50 (20.0%) cases had placental weight of 400-450 grams and 20 (8.0%) cases had placental weight more than 450 grams.

We observed that, 22 (8.8%) cases required neonatal resuscitation while 228 (91.2%) did not require neonatal resuscitation. It was observed that 25 (10.0%) cases required NICU admission while 225 (90.0%) did not require NICU admission.

Coming to conclude, preterm labour followed by IUGR are the 2 most commonly encountered perinatal outcome of pregnancy induced hypertension, and low birth weight being the most common neonatal outcome. The percentage of Gestational hypertension was found to be 58.0% in the study, pre-eclampsia was found to be 32.0%, eclampsia was found to be 6.0%, and pre-eclampsia superimposed on chronic hypertension was found to be 4.0%. The mean age in cases of PIH was found to be 24.40 +/- 3.3 years of age. Positive family history of PIH was seen in 14.0% cases. We observed proteinuria in 42.0% of cases and oedema 44.0% of cases. We observed that the lipid profile was towards the higher side in most of the cases, the most common mode of delivery was vaginal but we observed a significant rise in emergency LSCS in my cases. There was reduced placental weight in most of my cases.

Proper antenatal care with a diagnosis of pregnancy induced hypertension at an early stage can markedly reduce its complications in patients.

Conclusion

The study states that, preterm labour and IUGR are the most commonly encountered perinatal outcomes and low birth weight being the most common neonatal outcome in cases of pregnancy induced hypertension. In my study, the percentage of Gestational hypertension was found to be 58.0%, preeclampsia was found to be 32.0%, eclampsia was found to be 6.0% and preeclampsia superimposed on chronic hypertension was found to be 4.0%. The mean age in cases of pregnancy induced hypertension was found to be 24.4% +/- 3.3years. Positive past history of pregnancy induced hypertension was found in 14.0% cases. Proteinuria was found in 42.0% cases. Oedema was found in 44.0% cases. The lipid profile was found to be on the higher side in most of the cases. The most common mode of delivery was vaginal delivery but there was a significant rise in emergency LSCS in these cases. Low placental weight was observed in most of the cases.

To conclude with – Proper antenatal care with an early diagnosis of pregnancy induced hypertension could significantly reduce its perinatal, neonatal, and maternal outcome in patients.

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