



## Study of Maternal Outcome in Hypertensive Disorders of Pregnancy in A Tertiary Care Maternity Hospital of Delhi

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### ABSTRACT

**Introduction:** Hypertensive disorders of pregnancy is a serious disease contributing globally to maternal morbidity and mortality<sup>1,2</sup>. This study was conducted to study the maternal outcome of this threatening disorder in pregnancy and improving it by prevention and proper management of these complications.

**Aim:** To study maternal outcome in hypertensive disorders of pregnancy in a tertiary care maternity hospital of Delhi.

**Method:** A "prospective case – control observational study" was conducted in the department of Obstetrics and Gynaecology, Kasturba Hospital, New Delhi from January 2014 to December 2014.

**Results:** In the current study, 44.9% of the cases had to be induced and 30.6% had to be delivered by LSCS. The most common maternal complication (26%) seen among cases was preterm delivery out of which 65% were induced preterm deliveries. Other complications include visual disturbances like blurring of vision which occurred in 8% of cases, Eclampsia occurred in 7% of cases out of which 6 had antepartum and 1 case had postpartum seizures, PPH and abruption occurred in 6% and 5% of cases respectively. There were 2 cases of maternal mortality (Fatality rate=2%).

**Conclusion:** Pregnancies complicated by preeclampsia-eclampsia are more likely to have received obstetric interventions such as induction of labour and caesarean section operations and are associated with maternal morbidities such as abruption placenta, post partum haemorrhage, visual disturbances and eclampsia.

**KEYWORDS :** Preeclampsia, eclampsia, maternal outcome

### INTRODUCTION

Hypertensive disorders of pregnancy is one of the maternal multifactorial disease that still perplexes obstetricians all over the world and seriously endangers the safety of the mother and fetus during pregnancy. It is the 2<sup>nd</sup> most common medical disorder during pregnancy affecting 5-10% of all pregnancies<sup>3</sup>.

As per WHO estimates, around 2,87,000 maternal deaths occurred in 2010 with a wide variation across regions (from 1 in 3800 in developed countries to 1 in 39 in sub-Saharan Africa)<sup>4</sup>. Hypertensive Disorders of Pregnancy accounted for nearly 18% of all maternal deaths worldwide, with an estimated 62000-77000 deaths per year<sup>5</sup>.

In India, the incidence of this threatening condition was 5.38%<sup>6</sup>. Maternal deaths have been reported in 5.5% of deliveries<sup>6</sup>.

National High Blood Pressure Education Program (2000) categorizes hypertensive disorders of pregnancy into 5 types<sup>5</sup>. Out of these the most frequent is Gestational Hypertension prevalence being 6-15% in nulliparous women<sup>7,8</sup> and 2-4% in multiparous<sup>8</sup>. Other types include Preeclampsia, Eclampsia, Preeclampsia superimposed on chronic hypertension and Chronic hypertension. Preeclampsia and eclampsia is a major cause of morbidity and mortality for women and her child affecting 4-5% of all pregnancies<sup>5</sup>. Chronic hypertension is seen in 0.5-3% of all pregnancies<sup>8</sup>.

The various life threatening maternal complications that can occur in preeclampsia in antenatal period are eclampsia, pulmonary edema (affecting 3% of patients), acute renal failure, abruption placenta (occurs in 7% of patients with eclampsia), HELLP syndrome and intracranial bleeding (leading cause of maternal death in preeclampsia)<sup>8</sup>. The most common causes of maternal death are intracranial bleeding and acute renal failure secondary to abruption placenta<sup>8</sup>.

During labour and delivery, maternal morbidity is increased due to eclampsia, increased rates of induction of labour and caesarean sections. The altered coagulability can cause postpartum haemorrhage and shock. Increased rates of induction of labour and operative interference can lead to maternal sepsis<sup>9</sup>. Most deaths in preeclampsia and eclampsia occur due to complications and not hypertension per se<sup>10</sup>. Thus, we can reduce the maternal mortality by prevention and proper management of these complications.

### MATERIALS AND METHODS

We conducted a hospital based prospective case control study at Kasturba hospital from January 2014 to December 2014.

100 pregnant women with singleton pregnancy with cephalic presentation with hypertension attending the antenatal outpatient department in Kasturba Hospital were taken as cases. Hypertension during pregnancy is defined as a sustained systolic blood pressure of 140mm Hg or more and/or a diastolic blood pressure of 90mmHg or more on 2 occasions at least 6 hours apart but within 7 days<sup>1</sup>. Exclusion criteria included pregnancies complicated with diabetes mellitus, severe anaemia, heart disease, primary renal disease, collagen vascular diseases, epilepsy, patients with any presentation other than cephalic, with multiple pregnancy, Rh-negative mothers, estimated birth weight <500 grams, major fetal anomaly. The cases were classified as follows:

**Category 1:** BP  $\geq$  140/90 mm Hg without proteinuria after 20 weeks of gestation = **gestational hypertension** **Category 2:** BP  $\geq$  140/90 mmHg after 20 wks gestation with proteinuria > 300mg/24 hr or >1+ dipstick = **preeclampsia** **Category 3:** Preeclampsia complicated with convulsions = **eclampsia** **Category 4:** BP  $\geq$  140/90 mmHg before pregnancy or before 20 wks of gestation but developing proteinuria > 300mg/24 hr or >1+ dipstick after 20 wks gestation or a sudden increase in proteinuria or BP or platelet < 100,000/dl in women with hypertension and proteinuria before 20 weeks = **pre-eclampsia superimposed on chronic hypertension** **Category 5:** BP  $\geq$  140/90 mmHg before pregnancy or before 20 wks of gestation, not attributable to gestational trophoblastic disease or persisting beyond 12 wks postpartum = **chronic hypertension**

100 normal pregnancies without hypertension matched with cases at the time of admission in respect of age, parity, gestational age were taken as controls.

Information was obtained in the following steps: All the pregnant women attending the antenatal care were screened for hypertension. Hypertensive pregnant women were included in the study and they were followed till delivery and 12 weeks post delivery. Patients were hospitalized once the diagnosis was made. In selected cases (gestational hypertension, mild preeclampsia, chronic hypertension with regular blood pressure measurements) at the request of the patient, ambulatory control was allowed.

On admission **General physical examination**, built, nutritional status, height, weight, Blood pressure and pulse along with absence or presence of pallor and pedal edema were done. The weight gain in this pregnancy was noted. For blood pressure monitoring the patient was seated comfortably with the back supported, arm supported at heart level, and the bladder of the cuff encircling 80% of the arm circumference. The mercury column was deflated at 2 to 3 mm/s, and the first and last audible sounds were taken as systolic and diastolic pressure. The column was read to the nearest 2 mm Hg. Edema was demonstrated by pressing the medial malleolus with thumb after 2 hours of rest. A **Systemic examination** of CNS, CVS AND Respiratory system was also done. **Abdominal examination** was done for height of uterus in weeks, the lie of fetus, presentation, and position of the fetus, fetal heart rate, amount of liquor.

**Laboratory examination** included: Hemoglobin, Total Leukocyte count, differential count, platelet count, bleeding time, clotting time and peripheral blood smear. Blood Urea, serum creatinine, serum uric acid, LFT (ALT, AST, LDH, ALP), Total protein, Albumin, Globulin, Bilirubin-total and direct, Electrolytes, Fasting blood sugar and Glucose Challenge Test. Urine routine and microscopic examination, urinary dipstick evaluation for albumin and sugar. In suspected coagulation disorder-bleeding time, clotting time, PT and aPTT were done. Fundoscopy was also done. Other investigations were carried out as and when required.

Blood pressure monitoring was done according to the severity of the disease. Questioning about Daily fetal movement count, blurring of vision, development of scotomas, headaches and epigastric pain or right upper quadrant pain was done.

Fetal monitoring consisted of DFMC, FHR monitoring, NST, umbilical and cerebral Doppler. USG was done for the fetal weight, serial growth, AFI, BPP, placental location and maturity.

Treatment included rest, dietary changes, control of blood pressure by using antihypertensives (methyldopa, labetalol or nifedipine) and obstetric management. In patients of Eclampsia, treatment was given for control of BP, control of seizures by anticonvulsants (MgSO<sub>4</sub> was used as the anticonvulsant of choice and Pritchard regimen was followed: 4gm of 25% MgSO<sub>4</sub> I.V was given slowly over 5-10 minutes and 5gm of 50% MgSO<sub>4</sub> I.M was given into each buttock followed by 5gm 50% MgSO<sub>4</sub> I.M 4hrly in alternate buttock) and control of complications. Ultimately pregnancy was terminated and delivery was conducted.

In mild preeclampsia and gestational hypertension termination of pregnancy was done by inducing labor at 37 weeks as at this gestational age, the maternal and fetal risks during expectant management clearly outweigh potential benefits to the fetus. In patients <37 weeks of gestation, termination of pregnancy was warranted only if maternal condition deteriorated or if there was fetal compromise.

Pregnancy was terminated by LSCS for urgent termination for maternal sake as in acute fulminating preeclampsia and eclampsia when cervix was not ripe and also for fetal sake when fetus was in jeopardy as indicated by deranged Doppler studies (reverse diastolic flow), severe IUGR, meconium staining of liquor or fetal distress.

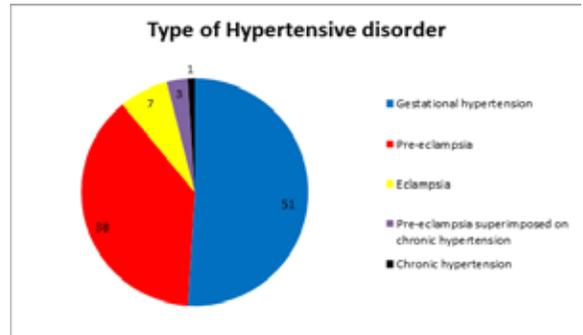
After termination of pregnancy the patient was followed up till 12 weeks and then maternal outcome was analyzed in terms of induction of labour done, caesarean sections, Preterm labour, Antepartum haemorrhage, Eclampsia, Pulmonary oedema, Acute renal failure, Cerebrovascular accident, HELLP syndrome, mode of delivery, PPH, Sepsis and Maternal death.

Collected data was coded into variables, entered into statistical software and analyzed using SPSS version 16. Tests of significance like chi-square and Fisher's exact test were used when suitable. Multiple logistic regression was used to calculate adjusted odd's ratio.

**RESULTS**

A prospective case control study was carried out at Kasturba hospital to assess risk factors for hypertensive disorders of pregnancy and fetal-maternal outcome in these patients. 100 pregnant women with hypertensive disorder of pregnancy were studied and compared with 100 pregnant women as controls without hypertensive disorder of

pregnancy (age, parity and gestational age matched). The observations and results were analyzed using SPSS version 16. The differences were considered to be significant if the p-values were less than 0.05.



**Figure 1: Distribution of cases according to the type of hypertensive disorder**

Majority of the cases in our study (51%) had Gestational hypertension followed by pre-eclampsia (38%). Eclampsia constituted 7% (6% had antepartum eclampsia and 1% had postpartum eclampsia) while pre-eclampsia superimposed on chronic hypertension and chronic hypertension were diagnosed in 3% and 1% of cases respectively

**Table 1: Mode of onset of labor among study subjects**

Type of onset	Cases(n=98) No. (%)	Controls(n=100) No. (%)
Spontaneous	54 (55.1)	89 (89)
Induced	44 (44.9)	11 (11)
Total	98 (100)	100 (100)

(χ<sup>2</sup> = 28.349, p=.000)

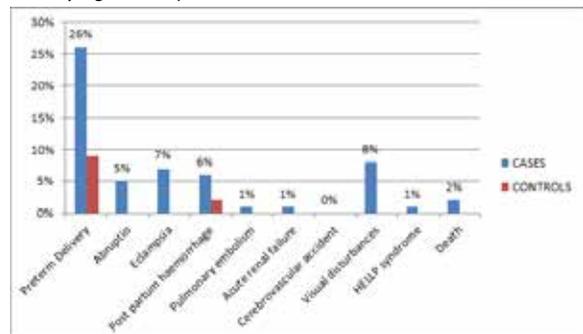
During the present study, 2 cases with hypertensive disorder of pregnancy died before onset of labour. 55.1% of the remaining 98 cases had spontaneous onset of labour whereas labor had to be induced in 44.9%. Among controls, 89% had spontaneous onset and 11% had induced labor. Thus rate of induction was much higher in cases than in controls, the difference being statistically significant (p=.000).

**Table 2: Mode of delivery among study subjects**

Mode of delivery	Cases No. (%)	Controls No. (%)
Vaginal	68 (69.4)	87 (87)
LSCS	30 (30.6)	13 (13)
Total	98 (100)	100 (100)

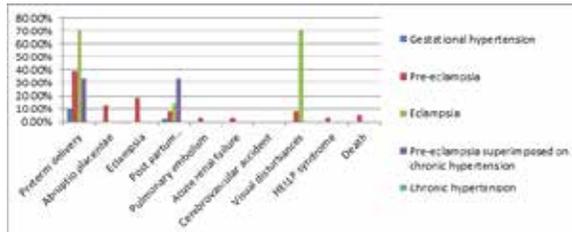
(χ<sup>2</sup> = 9.031, p=.003)

Out of 98 cases, 69.4% women delivered vaginally and remaining 30.6% of cases had to be delivered by LSCS. 87% of controls delivered vaginally and 13% were delivered by LSCS and the difference was statistically significant (p=.003).



**Figure 2: Maternal complications among study subjects with hypertensive disorders of pregnancy**

The most common maternal complication (26%) seen among cases was preterm delivery out of which 65% were induced preterm deliveries. Visual disturbances like blurring of vision occurred in 8% of cases but there was no case of vision loss. Eclampsia occurred in 7% of cases out of which 6 cases had antepartum and 1 case had postpartum seizures. 5% of cases had Abruptio placentae. Post partum haemorrhage (that is bleeding greater than 500ml) occurred in 6% of cases. There were 2 cases of maternal mortality (Fatality rate=2%) out of which 1 died due to pulmonary embolism while the other died due to HELLP syndrome and ARF. In controls 9 had Pre-term delivery and 2 had post-partum hemorrhage.



**Figure 3: Distribution of maternal complications in cases according to categories of hypertensive disorder of pregnancy**

Of the various groups of hypertension, 71.4% of cases of eclampsia and 39.5% of cases with preeclampsia had preterm delivery while only 9.8% cases with gestational hypertension had pre-term delivery. Abruptio placentae occurred in 13.2% cases of preeclampsia and in none of the other groups. Visual disturbances occurred in 5 out of 7 cases with eclampsia and 3 out of 38 cases with preeclampsia. No visual disturbance was found in any other group. Maternal death occurred in 2 cases of preeclampsia. No maternal mortality occurred in any other group of hypertension.

**DISCUSSION**

The present study was conducted at Kasturba hospital, Daryaganj. Poverty and illiteracy go hand in hand among people living in the area catered by this hospital. Risk factors for pregnancy induced hypertension are therefore quite high in this community. The present study was undertaken to study the risk factors in patients presenting with hypertensive disorders of pregnancy and to assess the maternal and fetal outcome in these patients.

More than half of the cases (51%) had Gestational hypertension followed by Pre-eclampsia (38%) in our study. Eclampsia constituted 7% (6% had antepartum eclampsia and 1% had postpartum eclampsia) while pre-eclampsia superimposed on chronic hypertension and Chronic hypertension constituted 3% and 1% consecutively. This finding was consistent with a study done by Wadhvani R et al<sup>11</sup> (2013) showing proportion of cases with Gestational hypertension, Preeclampsia, Eclampsia, Chronic hypertension to be 53.03%, 28.78%, 16.65% and 1.5% respectively. Ganguly S et al<sup>12</sup> (2005) in their study in Dhaka also found that Gestational hypertension and Preeclampsia accounted for 35.6% and 33.4% cases respectively followed by Eclampsia (24.3%), chronic hypertension (4.5%) and Pre-eclampsia superimposed on chronic hypertension (2.1%).

Sno.	Study	Gestational hypertension	Preeclampsia	Eclampsia	Preeclampsia superimposed on chronic hypertension	Chronic Hypertension
1	Ganguly S et al <sup>12</sup> study (2005)	35.6	33.4	24.3	2.1%	4.5%
2	Wadhvani R et al <sup>11</sup> study (2013)	53.03%	28.8%	16.65%	-	1.5%
3	Our study	51%	38%	7%	3%	1%

This shows that Gestational hypertension and Preeclampsia/Eclampsia is the predominant group of hypertensive disorder of pregnancy.

Spontaneous onset of labor was seen in 55.1% of the cases. In the rest of 44.9% of cases, labor had to be induced. Among controls 89% had spontaneous and 11% had induced labor. Thus rate of induction was significantly higher in cases than in controls (p=.000). Wolde Z et al<sup>13</sup> (2009-2010) in his cross-sectional study in Ethiopia also observed that 36.6% of the deliveries were induced in cases of pregnancies complicated by hypertensive disorder. Similarly, induction rate of labour was 52.8% in cases in a study by Yadav S et al<sup>14</sup> (1997) in Delhi.

Sno.	Study	Rates of Induction
1	Yadav S et al <sup>14</sup> (1997)	52.8%
2	Wolde Z et al <sup>13</sup> (2009-2010)	36.6%
3	Our study	44.9%

Termination of pregnancy is the definite cure of preeclampsia. Current obstetrical practice is to deliver women with hypertensive disorders of pregnancy regardless of disease severity, at 37 gestational weeks. At this gestational age, the maternal and fetal risks during expectant management clearly outweigh potential benefits to the fetus. In addition, delivery is recommended at < 37 weeks if maternal condition deteriorates or if there is fetal compromise. Therefore the rates of induction of labor is high in hypertensive disorders of pregnancy.

As high as 30.6% of cases had to be delivered by LSCS while in controls only 13% were delivered by LSCS. A statistically significant difference was observed (p=.003). Wolde Z et al<sup>13</sup> (2009-2010), Pawar D S et al<sup>15</sup> (2010-2011) and Gawde A et al<sup>16</sup> (2012) also reported LSCS as mode of delivery in 33.9%, 44% and 54% of cases respectively.

Sno.	Study	Rates of LSCS
1	Wolde Z et al <sup>13</sup> (2009-2010)	33.9%
2	Pawar D S et al <sup>15</sup> (2010-2011)	44%
3	Gawde A et al <sup>16</sup> (2012)	54%
4	Our study	30.6%

In patients of hypertensive disorder of pregnancy, LSCS is indicated for urgent termination for maternal sake as in acute fulminating preeclampsia and eclampsia when cervix is not ripe and also for fetal sake when fetus is in jeopardy as indicated by deranged Doppler studies (reverse diastolic flow), severe IUGR, meconium staining of liquor or fetal distress.

The most common complication among cases was preterm delivery that occurred in 26% of the cases out of which 65% were induced preterm deliveries. In controls only 9% had pre-term delivery as against 26% preterm deliveries in cases and this difference was statistically significant (p=.002). Similarly preterm delivery rate was 28.8% and 37% in hypertensive cases in studies done by Yadav S et al<sup>14</sup> and Bangal V B et al<sup>17</sup>. Preterm delivery rate is higher in hypertensive disorders of pregnancy because of the greater need to terminate pregnancy in case of worsening maternal or fetal condition.

Eclampsia occurred in 7% of cases out of which 6% were in antepartum period and 1% in postpartum period. Similarly in a study done by Nawaz F et al<sup>18</sup> and Pawar D S et al<sup>15</sup> Eclampsia occurred in 5% and 11.57% respectively while in a study done by Wadhvani R et al<sup>11</sup>, eclampsia occurred in 16.65% cases. Most antepartum eclampsia occurs in the third trimester (90%)<sup>19</sup>. Most cases of postpartum eclampsia occurs within 48 hours of delivery<sup>19</sup>.

Abruptio placentae occurred in 5% cases with hypertension while none of the controls experienced it. Similarly, in a study done by Pawar D S et al<sup>15</sup>, abruptio placentae occurred in 5.26% of the cases with hypertension while it was as high as 14% in PIH cases in a study done by Bangal V B et al<sup>17</sup>.

6% of the cases with hypertension had PPH while only 2% controls had PPH. This difference was not found to be statistically significant. Similarly in a study by Bangal V B et al<sup>17</sup> 4.76% of cases with hypertension had PPH and 5.26% cases of hypertension had PPH in a study done by Pawar D S et al<sup>15</sup>.

Visual disturbances like blurring of vision occurred in 8% of the cases with hypertensive disorder of pregnancy while no such visual disturbance occurred in controls. Similar results were reported in a study by Sachan R et al<sup>20</sup> in which visual symptoms like blurring of vision were present in 6.4% cases. Scotoma, blurred vision or diplopia are common with severe preeclampsia and eclampsia<sup>3</sup>. Blindness is rare and is reversible<sup>3</sup>.

2.6% (1 out of 38 cases) of preeclampsia cases developed HELLP syndrome. Similarly in a study by Gawde A et al<sup>16</sup> upto 3% of preeclampsia cases suffered HELLP syndrome. Upto 5.26% of PIH cases suffered HELLP syndrome in a study done by Pawar D S et al<sup>17</sup>.

The patient with HELLP syndrome had acute renal failure. Thus in our study only one belonging to preeclampsia group had acute renal failure. Acute renal failure was also observed as a complication of hypertensive disorders of pregnancy in one out of 100 cases in a study done by Bangal V B et al<sup>17</sup> and upto 3 out of 100 cases in a study done by Gawde A et al<sup>16</sup>. Acute renal failure is a rare complication of preeclampsia (1 in 10,000). Preeclampsia is a major cause of obstetric acute renal failure<sup>10</sup>. Acute renal failure is most commonly due to acute tubular necrosis which is invariably induced due to coexisting obstetric haemorrhage without adequate blood replacement<sup>19</sup>.

There was 1 case of pulmonary embolism in our study in the preeclampsia group. Pulmonary embolism as a complication was also observed in 1 out of 142 cases in a study done by Sachan R et al<sup>20</sup>.

There were 2 cases of maternal mortality (Fatality rate=2%) out of which 1 died due to pulmonary embolism while the other died due to HELLP syndrome and ARF. Similarly fatality rate was 1% in a study done by Gawde A et al<sup>16</sup> and 2.7% in a study done by Ganguly S et al<sup>12</sup>.

Among various groups of hypertension, maximum maternal complications were seen in preeclampsia-eclampsia group. 71.4% of cases of eclampsia and 39.5% of cases with preeclampsia had preterm delivery. Abruptio placentae occurred in 13.2% cases of preeclampsia. 7 preeclamptic cases progressed to eclampsia. Post partum haemorrhage was seen in 14.3% and 7.9% of eclampsia and preeclampsia cases respectively. Visual disturbances occurred in 5 out of 7 cases with eclampsia and 3 out of 38 cases with severe preeclampsia. Maternal death occurred in 2 cases of severe preeclampsia group. No maternal mortality occurred in any other group of hypertension in our study. These findings are consistent with the results of Bangal V B et al<sup>17</sup> where preeclampsia and eclampsia accounted for 33.33% and 52.63% of preterm deliveries respectively and preeclampsia alone accounted for 12.34% of abruptio placentae, 2 cases of PPH, 2 cases of HELLP syndrome and one case of renal failure.

## CONCLUSION

Pregnancies complicated by preeclampsia-eclampsia are associated with maternal morbidities such as abruptio placentae, post partum haemorrhage, visual disturbances and eclampsia. Also they are more likely to have received obstetric interventions such as induction of labour and caesarean section operations. Life threatening complications occurring in preeclampsia like HELLP syndrome, DIC, Eclampsia, Cerebrovascular accidents, Acute renal failure, pulmonary edema and pulmonary embolism contribute significantly to maternal mortality.

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