

## A clinical study of maternal and perinatal outcome in preeclampsia

Rohini Kondrakunta<sup>1</sup>, Sarada Bandaru<sup>2\*</sup>

<sup>1</sup>Assistant Professor, Department of Obstetrics and Gynecology, Apollo Institute of Medical Sciences and Research, Chittoor, AP, India

<sup>2</sup>Associate Professor, Department of Obstetrics and Gynecology, Apollo Institute of Medical Sciences and Research, Chittoor, AP, India

Received: 14-06-2021 / Revised: 06-07-2021 / Accepted: 17-09-2021

### Abstract

**Background:** Hypertensive disorders complicating pregnancy continue to be rampant globally and is responsible for majority of maternal and fetal morbidity and mortality. Preeclampsia though still obstetric enigma, it has almost been eradicated from the developed world. More women die due to preeclampsia in India than anywhere else in the world. **Aim & Objectives:** The objective of this study was to analyse the cases of preeclampsia complicating pregnancy and its maternal and perinatal outcome in relation to preterm delivery, IUD/ still birth, and early neonatal death and also the management of preeclampsia in pregnancy. **Method:** A prospective study conducted on 100 pregnant women between 30 – 40 weeks gestation admitted to the hospitals attached Apollo Institute of Medical Sciences and Research Chittoor during the study period (March 2020-July 2021). The study had 2 groups – 50 pregnant women with preeclampsia as cases and 50 normal pregnant women as controls. Statistical methods like Chi-square test and Independent samples t-test were employed for the study. **Results:** In the present study, the overall incidence of hypertensive disorders is 16.66%, out of which the incidence of preeclampsia accounted for 14.66%. The number of preterm deliveries were 17 (34%) and IUGR were 6 (12%). Perinatal mortality was seen in 12% of the cases, with prematurity as the most commonest cause of mortality. Caesarean section rate was 46%. Commonest maternal complications were Atonic PPH and Abruptio placenta. **Conclusion:** The early use of antihypertensive drugs, optimum timing of delivery and strict fluid balance, anticonvulsants in cases of eclampsia will help to achieve successful outcome. Early transfer to specialist centre is important and the referral centres should be well equipped to treat such critical patients. Training and continuing medical education of the attending staff and structuring management protocols relevant to local needs also is an important part in the prevention and management of preeclampsia.

**Keywords:** Post partum, Hemorrhage, Maternal Morbidity, Perinatal mortality, preeclampsia, Prematurity, Premature rupture of membranes, HELLP syndrome

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### Introduction

Hypertensive disorders of pregnancy complicate about 8% of all gestations and are responsible for significant maternal and perinatal morbidity and mortality[1].

Preeclampsia is a common pregnancy specific syndrome that originates in the placenta and accounts for a considerable proportion of both maternal and perinatal deaths, while hypertension without proteinuria generally has a far more benign course[2]. It usually develops after 20 weeks of gestation and resolves after delivery of the placenta. Several classifications of hypertension in pregnancy have been used, of which the classification of hypertensive disorders by the Working Group of the National high blood pressure education program [NHBPEP] (2000) has widest acceptance[3].

It affects 3-5% of all the pregnancies[2]. In India, there is 5-15% incidence of Pre-eclampsia[2]. It causes 10-15% maternal deaths in the developing countries[2].

The reason for increased maternal mortality and morbidity in developing countries are social deprivation, lack of access to trained birth attendants, lack of education, late referral to tertiary centres, lack of transport, unbooked status of the patient, nulliparity, prolonged state of unconsciousness and multiple seizures prior to admission[4].

Preeclampsia affects both the mother and the fetus. Despite several decades of research, while etiology remains elusive, the definitive treatment is clear termination of pregnancy.

The management of preeclampsia has gone through many changes and has achieved good results with the introduction of Newer Antihypertensives, Different regimes of Anticonvulsants and also increased awareness of the people[5].

The present study is undertaken to analyse the cases of preeclampsia, consequences in relation to the mother and the fetus and management aspect of the same. Ensuring safety of the mother and the fetus is the aim of Obstetric practice.

1. To study the maternal outcome in preeclamptic pregnant women between 30 weeks to 40 weeks with reference to age, parity, severity, mode of delivery, maternal complications and maternal mortality.
2. To study the perinatal outcome with reference to birth weight, Apgar score, NICU admission, perinatal complications and perinatal mortality.

### Materials and methods

#### Source of data

This study is a prospective study conducted on pregnant women between 30 to 40 weeks admitted to Hospital attached to Apollo Institute of Medical Sciences & Research Chittoor during the period

\*Correspondence

**Dr. Sarada Bandaru**

Associate Professor, Department of Obstetrics and Gynecology, Apollo Institute of Medical Sciences and Research, Chittoor, AP, India.

E-mail: [drsarada73@gmail.com](mailto:drsarada73@gmail.com)

of March 2020 to July 2021 after obtaining clearance from Hospital Ethical Committee.

#### Method of collection of data Sample size

100 pregnant women. The study will include two groups:

#### 1. The case group

It will include 50 preeclamptic pregnant women with the following criteria:-

#### Inclusion criteria

1. Pregnant women between 30 – 40 weeks of gestation.
2. Birth weight more than 1 kg.
3. Blood pressure >140/90mm of Hg with proteinuria.
4. Single intrauterine pregnancy.

#### Exclusion criteria

1. Pregnant women <30 weeks and >40 weeks of gestation.
2. Gestational Hypertension.
3. Chronic Hypertension.

#### 2. The control group

It will include 50 normotensive pregnant women between 30 weeks to 40 weeks of gestation.

#### Selection of cases

Both booked and unbooked, and all patients who were diagnosed to have preeclampsia and admitted to Maternity Hospital attached to Apollo Institute of Medical Sciences & Research were studied. All patients were between 30 weeks to 40 weeks of gestation.

The patients were selected irrespective of parity, consanguinity and from all socio-economic classes. Detailed history, period of gestation, last menstrual period of and expected date of delivery, history of previous pregnancies, results of present study were noted in the proforma.

#### Results

A total number of 15000 deliveries were conducted in hospital attached Apollo Institute of Medical Sciences & Research Chittoor during the period March 2020- July 2021. Hypertensive disorders in pregnancy was seen in 2500 cases admitted to the hospital with an incidence of 16.66%.

Preeclampsia cases were 2200 which accounted for 14.66% of the deliveries conducted.

The eligible cases for the study is 50 pregnant women without preeclampsia as controls i.e, Group A and 50 pregnant women with preeclampsia as cases i.e, Group B.

**Table 1: Age Distribution**

Age in years	Controls n (%)	Preeclampsia n (%)
≤ 20	7 (14)	1 (2)
21-24	26(52)	31(62)
25-29	14(28)	14(28)
30-34	3(6)	4(8)
Total	50(100)	50(100)
Mean Age± SD	23.2 ± 3.6	23.8 ± 3.1
T value	t = 0.89	
	p = 0.37	

- Maximum number of women were in the age group of 21- 29 years in both the groups A and B.
- Minimum number of women were in the age group below 21 years.
- Mean age of the women in group A was 23.2 years with a standard deviation of 3.6 years and mean age of the women in group B was 23.8 years with a standard deviation of 3.1 years.

**Table 2: Showing Number of Booked/ Unbooked cases**

Booked/ Unbooked	Controls n (5%)	Pre-eclampsia n (%)
Booked	42 (84)	34(68)
Unbooked	8(16)	16(32)
Total	50(100)	50(100)

In this study the maximum number of booked cases in group A were 42(84%) and in group B were 34 (68%). The number of unbooked cases were 8 (16%) among the controls and 16(32%) among the pre-eclampsia group. The percentage of unbooked cases were more in group B as compared with group-A

**Table 3: Parity Distribution**

Parity	Controls n (%)	re-eclampsian (%)
Multi	25 (50)	22 (44)
Primi	25 (50)	28 (56)
Total	50 (100)	50 (100)

In this study, the number of primigravida in the group A was 25 (50%) and in the group B was 28 (56%). There were 25 (50%) multigravidas in the group A and 22 (44%) in the group B. There is a marginal variation in the incidence among the primigravida and the multigravida

**Table 4: Gestational Age in Weeks**

Gestational Age in Weeks	Controls n (%)	Preeclampsian (%)
30-32	1 (2)	4 (8)
33-36	7 (14)	13 (26)
37-40	42 (84)	33 (66)
Total	50 (100)	50 (100)
Mean GA ± SD	38.04 ± 1.92	
t value	t = 2.72	
p value	p = 0.008, s	

The mean gestational age of the women in group A was 38.04 with a standard deviation of 1.92 weeks. The mean gestational age of the women in group B was 36.8 with a standard deviation of 2.59 weeks. Compared to the control group, the mothers with gestational < 37 weeks (preterm) were more in the preeclamptic group which is statistically significant.

**Table 5: Showing Platelet count**

Platelet count in lakhs/cumm	Controls n (%)	Pre-eclampsian (%)
< 1.5	4 (8)	17 (34)
1.5– 2	6 (12)	11 (22)
2– 2.5	17 (34)	12 (24)
>2.5	23 (46)	10 (20)
Total	50 (100)	50 (100)

Among the 50 women in group A, 23 (46%) mothers had platelet count more than 2.5 lakh/cumm. Only 4 (8%) mothers had platelet count less than 1.5 lakh/cumm. Among the 50 women in group B, only 10 (20%) had platelet count more than 2.5 lakh/cumm. Majority 17(34%) had platelet count less than 1.5lakh/cumm. This study showed that platelet count is grossly decreased in group B compared to group A which is statistically significant.

**Table 6: Laboratory Parameters**

Parameters	Controls	Preeclampsia
Blood Urea	Normal	50
	Increased	0
Serum Creatinine	Normal	49
	Increased	1
Liver Function Tests	Normal	37
	Abnormal	13

Blood Urea and Serum Creatinine was increased in only 1 patient among the group B women as compared with group A women. Altered LFT are seen in 26% of the preeclampsia patients.

**Table 7: Fundoscopy**

Fundoscopy Changes	Controls n (%)	Preeclampsia n (%)
Normal	50 (100)	45 (90)
Abnormal	0	5 (10)
Total	50 (100)	50 (100)

Abnormal fundoscopic changes were seen in the 5(10%) women of group B in comparison to group A.

**Table 8: Doppler Study**

Doppler Study	Controls n (%)	Pre-eclampsian (%)
Normal	49 (98)	40 (80)
Abnormal	1 (2)	10 (20)
Total	50 (100)	50 (100)

Abnormal Doppler changes were seen in 10 (20%) of the women in group B who were managed accordingly. Only 1 (2%) mother among group A had abnormal Doppler study.

**Table 9: Induction of Delivery**

Induction	Controlsn (%)	Preeclampsian (%)
Induced	3 (6)	16 (32)
Not Induced	47 (94)	34 (68)
Total	50 (100)	50 (100)

Only 3 (6%) women in group A were induced with PROM as the indication. Whereas 16 (32%) mothers in group B were induced with preeclampsia as the major indication and this is statistically significant. The other indication was PROM.

**Table 10: Type of Delivery**

Type of Delivery	Controlsn (%)	Preeclampsian (%)
Vaginal Delivery	38 (76)	21 (42)
Instrumental Delivery	4 (8)	6 (12)
LSCS	8 (16)	23 (46)
Total	50 (100)	50(100)

Of the 50 women in Group A, 38 had vaginal delivery, 4 had instrumental delivery and the remaining 8 had Caesarean section for various indications. Of the 50 women in group B, 21 had vaginal delivery, 6 had instrumental delivery and 23 underwent Caesarean section with majority of indications related to Preeclampsia. In this study, Caesarean sections were more than the normal vaginal deliveries in group B (46%). Instrumental deliveries were more in group B 12% as compared to group A 8%.

**Table 11: Maternal Complications**

Maternal Complications	Controls	Pre-eclampsia
Acute Renal Failure	0	1

Abruptio Placenta Grade II	0	3
Atonic PPH	2	3
HELPP Syndrome	0	1
Acute Pulmonary Edema	0	1
Traumatic PPH	1	1

Atonic PPH and Abruptio placentae are the most common complications in the women in group B followed by ARF, HELPP syndrome, traumatic PPH. Among the women in group A, 2 patients had atonic PPH and 1 had traumatic PPH. In comparison to the 2 groups, the incidence of maternal complications are more in the preeclamptic group B (20%). The incidence in the group A is 6%.

**Table 12: Weight distribution of the Baby**

Weight of the Baby (Kg)	Controls n (%)	Preeclamptic n (%)
1- 1.5	1 (2)	7 (14)
1.5 - 2.49	11 (22)	15 (30)
2.5- 2.99	27 (54)	13 (26)
>3	11 (22)	15 (30)
Total	50 (100)	50(100)

The birth weight of majority of babies born in the control group A was in the range of 2.5 – 2.99 kg (54%). The babies weighing more than 3 kg were 11(22%). 22 (44%) babies of the preeclamptic group B weigh less than 2.5 kg and 7 (14%) of the babies weigh less than 1.5 kg.

**Table 13: Mean Birth Weight**

Weight of the Baby	Controls	Preeclampsia	t value	p value
Mean Weight $\pm$ SD	2.71 $\pm$ 0.48	2.45 $\pm$ 0.71	2.08	0.04.s

Mean birth weight of the babies born in group A was 2.71 with a standard deviation of 0.48. Mean birth weight of the babies born in group B was 2.45 with a standard deviation of 0.71. This is statistically significant.

**Table 14: Apgar Score at 5 minutes**

APGAR Score	Controls n (%)	Preeclamptic n (%)
< 7	10 (20)	21 (42)
>7	40 (80)	29 (58)
Total	50 (100)	50 (100)

Low Apgar score is more common in group B (42%) as compared to group A. This is statistically significant.

**Table 15: NICU Admissions**

NICU Admissions	Controls n (%)	Preeclamptic n (%)
NO	40 (80)	28 (56)
YES	10 (20)	22 (44)
Total	50 (100)	50 (100)

- The rate of NICU admissions were more in group B (44%).
- The rate of admissions to NICU in group A was 20%.
- This is statistically significant.

**Table 16: Showing Maturity of the Babies**

Maturity of the Babies	Controls n (%)	Preeclampsia n (%)
Term	42 (84)	33 (66)
Preterm	8 (16)	17 (34)
Total	50 (100)	50 (100)

The number of preterm babies were 8 (16%) in the control group A and 17 (34%) in the preeclamptic group B. The incidence of preterm birth is more common in the preeclamptic group B.

**Table 17: Perinatal Complications**

Complications	Controls	Preeclampsia
Prematurity	8	17
Meconium Aspiration Syndrome	1	4
Respiratory Distress Syndrome	4	5
Low Birth Weight	0	6
Birth Asphyxia	1	0
No Complications	36	18
Total	50	50

Prematurity is the major perinatal complication (34%), followed by low birth weight, respiratory distress syndrome and meconium aspiration syndrome in group B.

Though Prematurity (16%) is the most common complication in Group A, it is less common than the group B which is followed by RDS and meconium aspiration syndrome. The incidence of perinatal

complications is more in the preeclamptic group B (64%) and it is statistically significant.

## Discussion

### Incidence

Hypertensive disorder in pregnancy is a common condition which is responsible for the majority of maternal and perinatal morbidity and mortality.

The incidence of hypertensive disorder in pregnancy (especially preeclampsia) and the total number of deaths from the same have come down dramatically in developed countries. This is totally attributed to the improvements in developed countries like health education, booked status of the patient, timely access to transport, trained birth attendants and resources and early referral to tertiary centres.

However, in developing countries it still stands one of the major complications of pregnancy.

- In this study, the overall incidence of hypertensive disorders was 16.66%
- According to ACOG 2013, Hypertensive disorders complicate 10% of the pregnancies.
- According to Rathore R et al 2008, Hypertensive disorders complicate 12-22% of all pregnancies in India[4].
- According to Fernando Arias, the overall incidence of hypertensive disorders in pregnancy was 7-15%[6].

In this study, the incidence of pre-eclampsia is on the higher side due to lack of education, lack of available resources and higher unbooked status of the women.

### Socio-economic status

In this study most of the women (76%) had come from the low socio-economic status.

According to Arup Kumar Mahji (2001)<sup>7</sup>, majority of the women belonged to the low socio-economic status which is largely related with health consciousness and health and family welfare of the people.

### Antenatal care

In this study, unbooked cases were 32% in the women with preeclampsia and 16% in normal pregnant women. The unbooked cases were more in the women with preeclampsia and it might be the reason for the high incidence of preeclampsia.

### Maternal Age and Parity

In this study, 62% were in the age group of 21-25 years with mean age of 23.8 years in the women with preeclampsia. Whereas 52% of women in the control group were in the age group of 21-25 years with a mean age of 23.2 years.

According to A.P.M.C 2008, frequency of disease increased at either ends of maternal age, with highest number of cases between 20-25 years.

In this study the notable fact was that primigravidas (56%) were slightly greater than multigravidas (44%) in the women with preeclampsia. In women in the control group primigravidas were equal to multigravidas.

According to Vitthal G Kuchake (2010)[8], primigravidas show the high risk of preeclampsia syndrome.

### Gestational Age

The mean gestational age of women in the control group is 38.04 ± 1.92 weeks and in the preeclamptic group is 36.8 ± 2.59 weeks. According to this study, women with preeclampsia presents at lesser gestational age at labour or for induction of labour in comparison to controls which is statistically significant.

### Laboratory Parameters

The platelet count was found to be < 2.5 lakhs/cumm in 80% of the women with pre-eclampsia and 54% of the women in control group. Majority of women among the cases had platelet count

less than 1.5lakhs/cumm.

According to Vitthal G Kuchake (2011)[8], the mean count of platelets in pre-eclamptic group was 2.19 lakhs/cumm.

### Fundoscopy and Doppler studies

Fundoscopy was abnormal in 5 women with preeclampsia with arteriolar changes and papilledema. All the women belonged to severe preeclampsia.

### Induction of labour

Most of the women in the preeclampsia group 32% had to be induced with labour with preeclampsia as the major indication for induction.

Only 3 women in control group were induced for PROM (Pre mature rupture of membranes). These women were induced as the definitive treatment of preeclampsia is termination of pregnancy.

### Mode of delivery

In this present study, the number of vaginal deliveries were 26 (54%) and Caesarean sections were 21 (46 %) among the women with preeclampsia. The vaginal deliveries were 42 (84 %) and Caesarean sections were 8 (16 %) among the women in the control group. Instrumental deliveries were more in the preeclamptic group (12%).

### Apgar Score

21 Babies (42%) in the preeclamptic group had Apgar score < 7 at 5 minutes of age and 10 (20%) in the control group had Apgar score < 7 at 5 minutes. Perinatal Mortality

- Perinatal mortality in the women with preeclampsia is 6 (12%) i.e, 120/1000 live births.
- Perinatal mortality in the control group is 2(4%) i.e, 40/1000 livebirths.
- Incidence of perinatal mortality in this study by Anthony (2004) is 5% in women with preeclampsia.
- The most common cause of death in this study is prematurity.

### Maternal Morbidity

Total number of women with Abruptio placenta in preeclamptic group were 3(6%). It was the commonest complication of preeclampsia.

Other complications are Atonic PPH, Acute renal failure, HELPP syndrome, Pulmonary edema and Traumatic PPH[9-16].

### Conclusion

Hypertensive disorders complicating pregnancy is one of the most extensively researched subjects in obstetrics. Still the etiology remains an enigma to us.

Preeclampsia still remains a major problem in developing countries. Though the incidence of preeclampsia and eclampsia is on the decline, still it remains the major contributor to poor maternal and perinatal outcome.

The fact that preeclampsia is largely a preventable disease is established by the negligible incidence of preeclampsia with proper antenatal care and prompt treatment of preeclampsia.

In preeclampsia, the pathology should be understood and that it involves multiorgan dysfunction should be taken into account.

The early use of antihypertensive drugs, optimum timing of delivery and strict fluid balance, anticonvulsants in cases of eclampsia will help to achieve successful outcome.

Early transfer to specialist centre is important and the referral centres should be well equipped to treat such critical patients. Training and continuing medical education of the attending staff and structuring management protocols relevant to local needs also is an important part in the prevention and management of preeclampsia.

### Acknowledgment

The author is thankful to Department of OBG for providing all the facilities to carry out this work.

### Conflict of Interest

None

**Financial Support**

Nil

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**Conflict of Interest: Nil****Source of support: Nil**