



Original Research Article

Epidemiology and fetomaternal outcomes in cases of imminent eclampsia and eclampsia- retrospective study

Manjusha Jindal^{1,*}, Dweep Jindal¹, Viraj Naik¹, Mrinalini Sahasrabhojane¹, Guruprasad Pednekar¹

¹Dept. of Obstetrics and Gynecology, Goa Medical College, Bambolim, Goa, India



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ABSTRACT

Context: The most common complication in pregnancy is Hypertension complicating 12-22% of all pregnancies. Among these pre-eclampsia is the leading cause constituting 10% of all pregnancies worldwide. In hospital practice in India, the incidence of pre-eclampsia varies from 5% to 15% and of eclampsia about 1.5%. According to WHO report 2008, eclampsia constitutes for 12% of all maternal deaths in developing countries. Thus it is important to study its Epidemiology and Management strategies.

Settings and Design: Retrospective descriptive data based study.

Materials and Methods: The data is collected after reviewing the medical records of all gravid women with hypertensive disorder of pregnancy who presented between July 2010–July 2014. Data was collected on pre-designed, standardised proforma of National Eclampsia Registry.

Statistical analysis used: Statistical analysis was performed using SPSS version 22. Data was expressed as Mean, percentages, proportions. Chi-square test was used to find association between various categorical variables. p-value <0.05 was considered to be statistically significant.

Results: During the study period there were 22,591 deliveries. There were 1468 mild and severe pre-eclampsia cases and 309 imminent eclampsia and eclampsia cases. The proportion of Pregnancy Induced Hypertension (PIH) cases was found to be 7.85% and that of eclampsia 1.36%. 74.34% of the patients belonged to age group between 20-30 years. 69.11% patients were primigravidas with significant correlation to parity (p value <.00). 68.4% cases were unbooked with p value <.00. 84.3% cases presented between 29-36 weeks. 56.96% patients had headache and 28.48% had headache with vomiting as premonitory symptoms. 74.4% patients had antepartum, 9.14% intra partum and 16.46% postpartum eclampsia. Increasing proteinuria was significantly related to no. of convulsions (p <.05). Maternal complications were seen in 21.68% cases. Maternal deaths during study period due to eclampsia complications were 1.3%. Perinatal complications were seen in 19.41% babies; prematurity being most common (40%). Low birth weight was seen in 68.09% babies which was statistically significant (p value <0.00). There was no significant change in the incidence of eclampsia over four years.

Conclusions: Present study highlights various risk factors for pre-eclampsia. Unbooked, young primigravida with significant proteinuria are at increased risk for pre-eclampsia-related morbidity and mortality. As doctor to patient ratio is below par, the role of ASHA workers is important. Government efforts to track all pregnancies will ensure adequate antenatal care especially to the socio-economically deprived and rural population. Doctors working in peripheral hospitals should have periodic training in the management of preeclampsia and eclampsia to avoid missed opportunities as well as better transport facilities to handle obstetric emergencies.

Key Messages: As no change in incidence of eclampsia over years, ASHA workers to be trained to identify warning signs. Doctors working in peripheral hospitals should have periodic training in the management of preeclampsia and eclampsia to avoid missed opportunities.

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1. Introduction

The most common complication in pregnancy is Hypertension complicating 12-22% of all pregnancies. Among these pre-eclampsia is the leading cause constituting 10% of all pregnancies worldwide.¹ In hospital practice in India, the incidence of pre-eclampsia varies from 5% to 15% and of eclampsia about 1.5%.² National Eclampsia registry in 2014 reported the incidence of Hypertensive disorders as 10.8% and eclampsia as 1.9%.³ Maternal mortality worldwide is systematically reviewed by World Health Organisation (WHO) and it was reported that 16% of maternal deaths were due to hypertensive disorders in developed countries.⁴ According to WHO report 2008, eclampsia constitutes for 12% of all maternal deaths in developing countries.⁵ In Asia and Africa, hypertensive disorders constituted for 9% of maternal mortality. In India, hypertensive disorders constitute 3rd most important cause of maternal mortality after hemorrhage and infection.⁴

International Society for the Study of Hypertension in Pregnancy (ISSHP)⁶ revised the classification for hypertensive disorders in pregnancy in 2014. Accordingly these disorders are classified as:

1. Chronic hypertension.
2. Gestational hypertension
3. Pre-eclampsia – de novo or superimposed on chronic hypertension and
4. White coat hypertension.

Preeclampsia is defined as multisystem, multi-factorial disease with Blood Pressure (B.P) reading of $\geq 140/90$ mm Hg on two occasions 4 hours apart and > 300 mg protein in 24 hour urine specimen after 20 weeks of gestation in a previously normotensive woman. Severe Preeclampsia is defined as B.P reading of $\geq 160/110$ mm Hg and > 5 gram protein in 24 hour urine specimen or symptoms of end organ failure like derranged Liver Function Tests, thrombocytopenia, oliguria, visual disturbances, pulmonary oedema and fetal growth restriction.¹ Eclampsia is defined as the development of seizures which cannot be attributed to other causes and /or unexplained coma during pregnancy or puerperium in a woman with pre-eclampsia. The term “eclampsia” is derived from a Greek word meaning “like a flash of lightning”. Alexander Hamilton (1781) described eclampsia as a disease which always attended with the utmost hazard and frequently kills the woman like a fit of apoplexy.¹ Eclampsia is most common in the third trimester and becomes more frequent near term.⁷ Eclampsia can be antepartum (38-53%), intrapartum (18-36%), or postpartum (11-44%).⁵ Maternal and pregnancy characteristics identified as risk factors for development of pre-eclampsia are nulliparity,

previous history of preeclampsia, maternal age over 40, multiple gestation, molar pregnancy, pregestational diabetes, vascular, endothelial or renal diseases, obesity and certain genetic factors.⁷ Various biochemical and biophysical markers have been studied to predict the development of preeclampsia. Uterine artery doppler velocimetry showing increased resistance in the late first and second trimesters is the only reliable predictive test for the development of preeclampsia. Currently no other test is reliable, valid or economical and have poor sensitivity and poor positive predictive value. Various strategies used to prevent or modify the severity of pre-eclampsia have been evaluated but none of them is found to be convincing or reproducible.⁸

The definitive treatment for eclampsia is delivery of the baby.⁵ Maternal and perinatal mortality and morbidity due to preeclampsia can be prevented by providing a good access to quality antenatal care, early diagnosis and identification of risk factors, careful monitoring and timely interventions.⁴ The perinatal mortality due to eclampsia is high upto the extent of about 30-50%.⁵ Poor fetal outcome is attributed to iatrogenic prematurity, respiratory distress syndrome (RDS), intrauterine asphyxia, intrauterine growth restriction (IUGR) and intrauterine death (IUD). In addition IUGR may lead to neuro-developmental defects in children at later stages of life.⁵ Maternal morbidity and mortality is due to disseminated intravascular coagulation (DIC), abruptio placentae, acute kidney injury (AKI), cerebrovascular accident (CVA), cardiovascular complications, Pulmonary edema, HELLP syndrome, Retinal detachment and Aspiration pneumonia.¹

The clinical management of eclampsia has gone through many changes to achieve better results. This study was undertaken to assess maternal and fetal outcome in severe Pre eclampsia, imminent eclampsia and eclampsia and to correlate various factors so as to enable us to draw out our hospital policy for management of these subjects to improve their outcome.

2. Aims & Objectives

1. To study the distribution pattern of Pre eclampsia, Imminent eclampsia and eclampsia among different group of patients with special reference to age, parity, booking status, and gestational age at presentation.
2. To study maternal outcomes in terms of severity, complications and maternal mortality
3. To study fetal morbidity and mortality.
4. To study the incidence of eclampsia over 4 years

3. Materials and Methods

Present study is retrospective, descriptive, data based study. The data was collected by reviewing the medical records of all gravid women with hypertensive disorder of pregnancy

* Corresponding author.

E-mail address: manjushajindal@gmail.com (M. Jindal).

managed between July 2010–July 2014. The study was approved by Institutional Ethics Committee. Preeclampsia was defined as blood pressure $\geq 140/90$ mmHg along with proteinuria of at least 300 mg/24 hour after 20 weeks of gestation. The criteria to diagnose severe preeclampsia were one or more of the following: Blood pressure $\geq 160/110$ mmHg, proteinuria of at least 5 gram/24 hours, oliguria <600 ml/24 hours or $<30-50$ ml/hour, symptoms indicating end organ damage such as headache, visual disturbances, epigastric pain, medical complications such as pulmonary edema, cerebral edema, acute renal failure, hepatic hematoma, and HELLP syndrome.⁹ Generalized tonic clonic seizures in a preeclamptic pregnant woman, not associated with other causes was considered to be due to eclampsia.

Data was collected on predesigned, standardised proforma of National Eclampsia Registry. Demographic parameters, gestational age, associated medical diseases such as hypertension, diabetes mellitus, history of smoking, presenting complaints, blood pressure recording at admission, laboratory investigations at admission (complete blood count, liver function tests, blood urea, serum creatinine, serum uric acid and coagulation profile), 24 hours urinary protein excretion were recorded. Complications such as eclampsia, HELLP syndrome, acute renal failure, disseminated intravascular coagulation, abruptio placentae and oliguria were noted. Fetal complications like IUGR, oligohydramnios, and fetal distress was documented. Antihypertensive drugs used were alphamethyl dopa, nifedipine and labetalol - both orally and parenterally, singly or in combination as needed. Cases of eclampsia received Injection Magnesium sulphate according to Pritchard regimen and imminent eclampsia received prophylactic Magnesium sulphate as per MAGPIE trial. Mode of delivery, indications for Caesarean section, obstetric factors like preterm labour and premature rupture of membranes, fetal birth weight, APGAR score at one and five minutes and requirement of NICU care were also noted. Perinatal mortality rate was defined as the number of all fetal (after 28 weeks of gestation) and neonatal (during the first 28 days after birth) deaths/1,000 births. Data was entered in epidata manager and analysed using SPSS 22 version. Data was expressed as mean, percentages, proportions. Chi-square test was used to find association between various categorical variables. p-value <0.05 was considered to be statistically significant.

4. Result

During the study period, there were 22,591 deliveries. There were 1,468 mild and severe pre-eclampsia cases and 309 imminent eclampsia and eclampsia cases. The proportion of Pregnancy Induced Hypertension (PIH) cases being 7.87% and that of imminent eclampsia and eclampsia being 1.37%.

Most of the subjects were in age group of 26-30 years that is 717 (40.35%) and 17.11% were either <20 years or >35 years in age. The cases of pre-eclampsia and eclampsia were more in young age group and the relation was statistically significant (chi-square = 670.5797, p value <0.00). (Table 1)

Out of 1777 cases, 1228(69.11%) subjects were primigravidas and 549(30.89%) were multigravidas. There was significant co-relation to parity.(chi-square = 185.1352, p value <0.00). (Table 2)

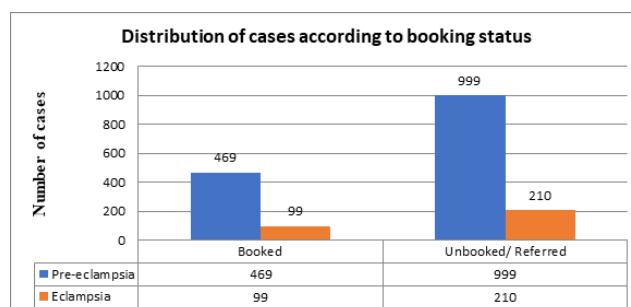


Fig. 1: Distribution of cases according to booking status

As seen in Figure 1 ; 568 (31.96%) cases were booked and 1209 (68.04%) cases were either unbooked or referred. Out of these, 210 cases of eclampsia were either unbooked or referred. The difference in booking status was statistically significant (chi square =163.668, p-value <0.00)

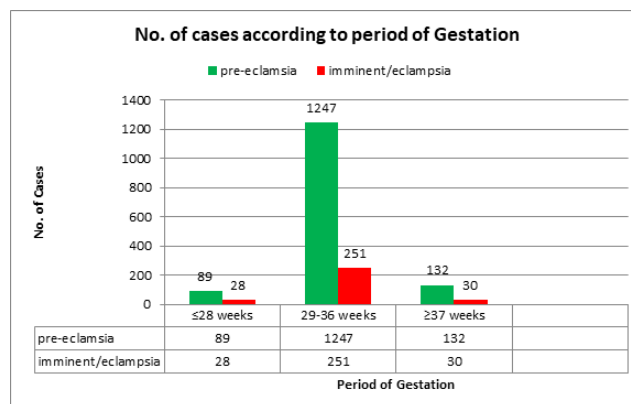


Fig. 2: Distribution of cases according to period of gestation

As seen in Figure 2, 1498 (84.3%) patients presented at 29-36 weeks of the gestation, 117 (6.58%) patients presented at less than 28 weeks of gestation and 162 (9.11%) patients presented at >37 weeks of gestation

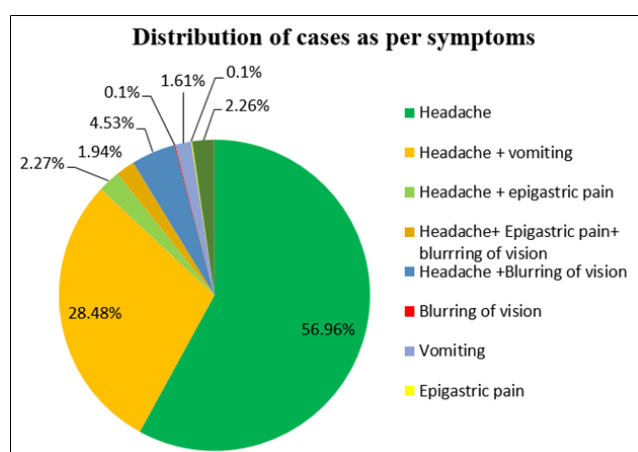
Figure 3 shows that more than half of the patients (56.96%), presented with headache as premonitory symptom, followed by headache and vomiting (28.48%), and others had headache with epigastric pain (2.27%), headache, epigastric pain and blurring of vision (1.94%), headache and blurring of vision (4.53%), blurring of vision

Table 1: Distribution of cases according to Age of patients

Age groups (years)	Pre-eclampsia	Imminent Eclampsia/Eclampsia	Total(N)	Percentage(%)
<20	180	36	216	12.16%
21-25	499	105	604	33.99%
26-30	587	130	717	40.35%
31-35	126	26	152	8.55%
>35	76	12	88	4.95%
Total	1468	309	1777	100%

Table 2: Distribution of cases according to Parity.

Parity	Pre-eclampsia	Imminent Eclampsia/Eclampsia	Total (N)	Percentage(%)
Primi	1012	216	1228	69.11%
Multi	456	93	549	30.89%

**Fig. 3:** Distribution of cases as per symptoms

(0.1%), vomiting (1.61%), epigastric pain (0.1%) and oliguria (2.26%).

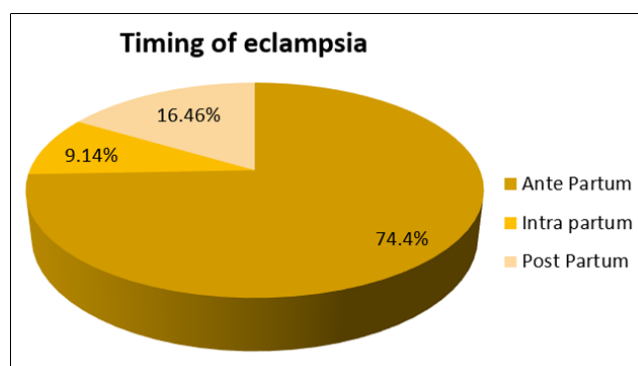
**Fig. 4:** Timing of eclampsia

Figure 4 shows that 74.4% patients had antepartum eclampsia, 9.14% intra partum and 16.46% had postpartum eclampsia.

Table 3 shows that 59.22% of the eclampsia patients had urinary proteins ≥ 3 plus. 18.77% patients had deranged SGOT and SGPT. 13.59% patients had elevated LDH and 14.24% patients had elevated serum bilirubin. 13.59% of the patients had deranged blood urea and serum creatinine. 15.21% patients had raised serum uric acid. 17.80% and 18.77% of the eclampsia patients had thrombocytopenia and deranged PT INR respectively.

As per Table 4, there were 148 cases of imminent eclampsia. With increase in proteinuria there was increase in the number of convulsions. There is positive correlation between proteinuria and number of convulsions with chi square statistic 133.4668 and p value < 0.05 .

Table 5 shows that 38.15% patients were treated with nifedipine alone and 29.77% were treated with labetalol alone. 24.31% patients required both nifedipine and labetalol and 7.77% needed nifedipine and alpha methyl dopa for control of hypertension.

As shown in Table 6, among the preeclampsia group of patients, 57.97% delivered vaginally and 42.03% underwent Caesarean section. Among the imminent eclampsia/eclampsia group of patients, 60.19% patients underwent Caesarean section, 35.92% delivered vaginally, 3.24% underwent assisted vaginal delivery and 0.65% required hysterotomy. This finding is significant with chi square = 36.4548 and P- value < 0.00001 .

Figure 5 shows that majority of patients were taken up for Caesarean section in view of previous cesarean delivery (37.61%) and unfavourable cervix (31.88%). Other indications for Caesarean section being failed induction (13.82%), Doppler abnormalities (8.97%), Cephalo Pelvic Disproportion (CPD) (4.73%) and abruptio placentae (2.99%).

Maternal complications were seen in 67 (21.68%) cases. As seen in Table 7, maternal complications seen were HELLP syndrome (5.83%), PPH (4.53%), Abruptio placentae (3.83%), Pulmonary edema (1.29%) and HELLP syndrome with AKI in 1.29% cases, renal failure in 1.94%

Table 3: Distribution of patients of eclampsia according to abnormal investigations

Investigations	Number of patients(n)	Percentage(%)
1. Urinary proteins		
a) \leq +1	38	12.3%
b) \geq 2+	88	28.48%
c) \geq 3+	183	59.22%
2. Abnormal Liver Function Tests		
a) SGOT	58	18.77%
b) SGPT	58	18.77%
c) LDH	42	13.59%
d) Serum Bilirubin	44	14.24%
3. Abnormal Renal Function Tests		
a) Blood urea	42	13.59%
b) Serum creatinine	42	13.59%
c) Serum uric acid	47	15.21%
4. Deranged Coagulation Profile		
a) Plateletcount (<1lakh/ cmm)	55	17.80%
b) Deranged PT INR	58	18.77%

Table 4: Distribution of cases of imminent eclampsia and eclampsia showing relation of urinary protein to No. of convulsions

Urinary proteins	Number of convulsions		
	0	1- 4	>4
\leq 1+	13	18	3
\geq 2+	30	32	8
\geq 3+	105	40	60
Total	148	90	71

Table 5: Antihypertensive drugs used in management.

Drugs	Pre-eclampsia	Imminent Eclampsia/ Eclampsia	Total (N)	Percentage(%)
Nifedipine	560	118	678	38.15%
Labetalol	437	92	529	29.77%
Nifedipine with Alpha Methyl Dopa	114	24	138	7.77%
Nifedipine with Labetalol	357	75	432	24.31%

Table 6: Mode of delivery

Mode of Delivery	Pre-eclampsia N(%)	Imminent Eclampsia/ Eclampsia N(%)
Normal vaginal delivery	851(57.97%)	111(35.92%)
LSCS	617(42.03%)	186(60.19%)
Assisted vaginal delivery	–	10(3.24%)
Hysterotomy	–	2(0.65%)
Total	1468(100%)	309(100%)

cases, DIC in 0.97% cases, ARDS, AKI with DIC, HELLP syndrome with IVH in 0.65% cases each.

As the proteinuria increased the number of fetomaternal complications also increased with a significant correlation. For maternal complications, the chi-square statistic is 10.1034. The p value is .006398. For fetal complications, the chi square stastic is 7.3408 and p value is .025467.

There were 4 maternal deaths during study period due to eclampsia complications (1.3%).

Patients with pre-eclampsia and eclampsia delivered babies with low birth weight and this finding was found to be statistically significant (chi-square statistic 439.2834; p-value <0.00) with significance of p-value at <0.05. The distribution of cases according to birth weight is shown in Table 9.

There were 285 cases of perinatal complications in cases of pre-eclampsia and 60 cases of perinatal complications in eclampsia group amounting to 19.41% in both the groups. The perinatal complications are shown in Table 10.

Table 7: Maternal complications in patients with imminent eclampsia and eclampsia

Maternal Complication	Number of cases (N)	Percentage (%)
ARDS	2	0.65%
Pulmonary edema	4	1.29%
DIC	3	0.97%
Renal failure	6	1.94%
Abruptio placentae	12	3.83%
HELLP Syndrome	18	5.83%
AKI with DIC	2	0.65%
HELLP Syndrome with Intra Ventricular Hemorrhage (IVH)	2	0.65%
Post Partum Hemorrhage (PPH)	14	4.53%
HELLP Syndrome with AKI	4	1.29%

(ARDS- Adult Respiratory distress syndrome)

Table 8: Correlation between urinary proteins andfeto-maternal complication

Urinary Proteins	≤ 1+	≥ 2+	≥ 3+	Total (N)
Maternal complications	4	7	56	67
Fetal complications	2	10	48	60

Table 9: Distribution of cases according to Fetal birth weight

Birth weight(kg)	Pre-eclampsia cases	Imminent eclampsia/ Eclampsia cases	Total (N)	Percentage (%)
1) <1.5	484	103	587	33.03%
2) 1.5- 2	303	62	365	20.54%
3) 2- 2.5	213	45	258	14.52%
4) >2.5	468	99	567	31.91%

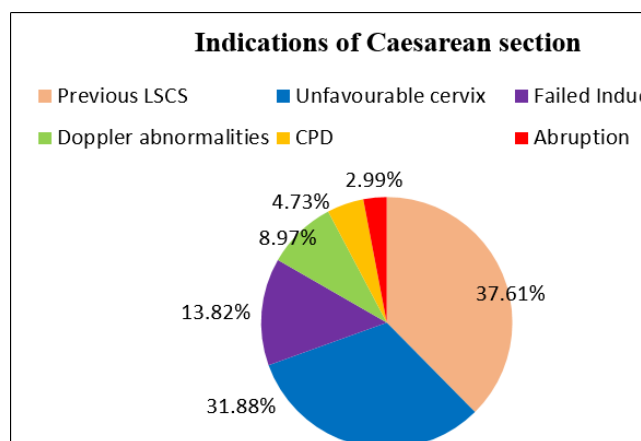


Fig. 5: Indications of LSCS

Prematurity was the most common perinatal complication in both the groups. There is significant statistical correlation between perinatal complications and pre-eclampsia and eclampsia (chi-square statistic 43.219; p-value <0.00)

The Perinatal mortality was found to be 18%. The no. of cases were analysed per year. Figure 6 shows the distribution of cases. There was increase in no. of cases detected in successive years. As the cases of imminent eclampsia and eclampsia were analyzed, it was noticed

that more cases were detected with imminent eclampsia than eclampsia though the relation was not significant (chi square= 6.4849, p=.37).

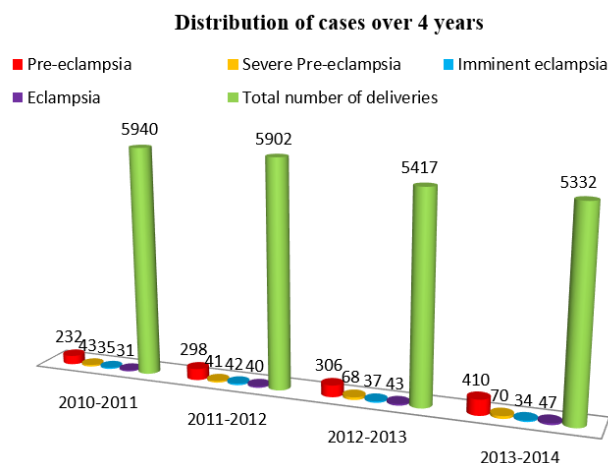


Fig. 6: Distribution of cases of pre-eclampsia and eclampsia over 4 years

Table 10: Perinatal complications

Complications	Pre-eclampsia	Imminent eclampsia/ Eclampsia	Total(n)	Percentage (%)
1. Prematurity	114	24	138	40%
2. RDS	85	18	103	29.86%
3. Birth Asphyxia	37	8	45	13.04%
4. IUGR/ MAS	49	10	59	17.10%

(MAS- Meconium Aspiration Syndrome).

5. Discussion

Hypertension can complicate pregnancy and lead to additional problems during pregnancy. These complications have long term effects on both mother and fetus. In our study we found the proportion of Pregnancy Induced Hypertension as 7.87% and that of eclampsia as 1.37%. Findings of our study are comparable to the findings of Nobis PN who reported an incidence of pre-eclampsia in hospital practice in India as 5 to 15% and that of eclampsia as 1.46%.² Sanjay G reported incidence of Hypertensive disorders as 10.08% and Eclampsia prevalence as 1.9% among eclampsia registry patients in India.³ Incidence of pre-eclampsia was 13.85% as reported by Juhi P, and 8.95% by Yucesoy G.^{10,11}

In our study 74.34% of the patients belonged to age group between 20-30 years. Similar findings were reported by Shrivastava A et al. (76%) and Singh A et al. (76.8%).^{12,13} Majority of patients (40.35%), belonged to age group of 26-30 years. The findings of our study are consistent with the findings of the study done by Pillai SS et al. who findings are similar documented 42.72% patients in the age group of 26-30 years.⁴ These findings are related to the fact that most women conceive first time in this age group.²

Two third of the subjects (69.11%) were primigravidas and approximately one third of them (30.89%) were multigravidas. Our findings are similar to study done by Pillai et al. and Patel et al. who documented 60.90% and 71% patients in their study group being primigravidas respectively.^{4,10} Duckitt K reported nulliparity as one of the risk factors in their systemic review of risk factors for preeclampsia.⁷ Frequent occurrence of pre-eclampsia in primigravidas may be related to failure of normal invasion of trophoblastic cells leading to maladaptation of spiral arterioles.¹³

In our study 68.04% cases were either referred or unbooked and 31.96% were booked patients. Findings of our study are similar to the findings of study done by Raji C. et al. (68.49%) and Patel J. et al. (68.75%).^{5,10} This could be attributed to the lack of proper antenatal care and follow up.²

In present study 84.29% cases presented at gestational age between 29-36 weeks, 6.58% patients presented at <28 weeks gestation and 9.12% patients presented at >37 weeks

gestation. Our study findings are consistent with the findings of study done by Patel J. et al. (87% - 28-37 weeks, 4% - <28 weeks and 9% - >37 weeks gestation) and Singh A. et al. (82.1% - > 34 weeks, 12.5%- 30-34 weeks and 5.4% - <30 weeks).^{10,13}

We observed that more than half of the patients of eclampsia had headache (56.96%) as premonitory symptom followed by a quarter having headache and vomiting (28.48%) as premonitory symptoms. Similar findings were found by Raji C. et al. and Shrivastava A. et al.^{5,12} Raji C. et al.⁵ found 58.20% patients having headache as premonitory symptom and 29.07% patients having headache and vomiting while Shrivastava A.¹² found that 58% had headache and 25% had headache and vomiting.

Though delivery is the definitive treatment of eclampsia, but convulsions do occur in post-partum period. In present study, eclampsia presented in antenatal period in 74.4% cases, intrapartum in 9.14% and post-partum in 16.46%. The findings are similar to that presented by Raji et al. (77.4% ante partum, 2.7% intra partum & 19.9% post partum).⁵ Anjani et al presented more No. of antepartum cases (92%) while review by Nobis showed 50.7% cases in antenatal period and 29.37 and 20% respectively in intrapartum & post partum period.^{2,12} It is difficult to differentiate between antepartum and intrapartum eclampsia. In our study increasing proteinuria was linked to increase in no. of convulsions and in turn to maternal and fetal complications.

In our study, we found that 59.22% cases had $\geq 3+$ proteinuria, 28.48% had proteinuria of $\geq 2+$ (87.7% patients having significant proteinuria) and only 12.3% patients had proteinuria of $\leq 1+$. Pillai SS. et al. found similar results (58.18%- $\geq 3+$, 28.18%- $\geq 2+$ and 13.63%- $\leq 1+$).⁴ Parmar M. et al. also documented significant proteinuria in 87% patients in their study.¹⁴ Deranged LFTs in the form of deranged SGOT and SGPT were found in 18.77% patients and deranged LDH and serum bilirubin were found in 13.59% and 14.24% patients respectively. Our study findings are similar to the findings reported by Pillai SS. et al. (Deranged SGOT and SGPT-19.09%, deranged LDH-13.63% and deranged serum bilirubin-14.03% cases).⁴ Devi SA. et al. reported deranged Liver function in 20% of cases and Singhal S. et al. in their study had deranged liver function in 20% of patients.^{15,16} Abnormal Renal Function Tests that is blood urea and serum creatinine were noted in 13.59% patients and raised uric acid (>7

mg%) was noted in 15.21% patients in our study. Pillai SS. et al. observed similar findings (Raised blood urea, serum creatinine and uric acid in 13.63%, 15.45% and 15.45% patients respectively).⁴ Devi SA. et al. also reported deranged renal function in 20% of cases.¹⁵ Platelet count less than one lakh/cmm was seen in 17.80% patients and deranged PT INR in 18.77% patients. Pillai SS. et al. showed similar findings i.e. platelet count less than 1 lakh/cmm in 14.54% patients and deranged PT INR in 16.36% patients.⁴

In our study control of Blood pressure was achieved using Nifedipine in 38.15% cases, Labetalol in 29.77% patients, 24.31% patients required Nifedipine with Labetalol and in only 7.77% patients Nifedipine with Alpha Methyl Dopa was used. Similar findings were stated by Pillai SS et al. i.e. use of Nifedipine in 39.09%, Labetalol in 28.18%, Nifedipine with Alpha Methyl Dopa in 8.18% and Nifedipine with Labetalol in 24.54% cases.⁴

As the definitive treatment of eclampsia is delivery; 60.19% eclampsia patients were delivered by Cesarean compared to 42.03% pre-eclampsia patients. 35.92% eclampsia patients were delivered vaginally compared to 57.97% pre-eclampsia patients ($p = <.00001$). 3.24% and 2% of the eclampsia patients delivered by assisted vaginal delivery and by hysterotomy respectively. Our findings are similar to the findings of Raji C. et al. who reported LSCS in 61.65%, normal vaginal delivery in 33.51%, Assisted instrumental vaginal delivery in 3.42% and hysterotomy in 0.68% cases and Pillai et al. (LSCS in 64.54% cases, normal vaginal delivery - 28.18%, Assisted vaginal delivery - 4.54% and hysterotomy in 2.72% cases).^{4,5} Most common indication for Caesarean section was previous LSCS (37.61%), followed by unfavourable cervix (31.88%), failed induction (13.82%), Doppler abnormalities (8.97%), Cephalo-Pelvic Disproportion (CPD) (4.73%) and abruptio placentae (2.99%). The higher rate of Caesarean section in eclampsia is due to early delivery approach to prevent further maternal and fetal complications especially when the cervix was unfavourable for induction.

In spite of early delivery, maternal complications were seen in 21.68% cases. Maternal complications in present study are compared with complications in earlier studies as shown in Table 11. We also observed that increasing proteinuria had significant correlation to maternal complications (p value = .006398)

There were 4 maternal deaths (1.3%) during the study period due to eclampsia and related complications. Madhuri CH. et al., Patel J. et al. and Yucesoy G. et al. documented 1.3%, 2% and 1.17% maternal deaths respectively in their studies.^{8,10,11}

With regards to fetal outcomes, it was observed that 68.09% babies had birth weight <2.5 kg. Our findings are similar to study done by Raji C et al. wherein they reported 60% babies having birth weight less than 2.5 kg and Joshi

P. et al. observed 68.54% babies with birth weight of <2.5 kg.^{5,17}

19.41% babies had perinatal complications. Perinatal complications also had significant correlation to increasing proteinuria ($p = <.00$). Prematurity was the most common perinatal complication. Our findings are similar to that reported by Raji C et al.⁵

Perinatal mortality was found to be 18% (6.98% neonatal deaths and 11.03% still births). Our findings are similar to the results reported by Pillai SS. et al and Madhuri CH. et al. who reported Perinatal mortality of 18% each.^{4,8}

The incidence of eclampsia was analysed over 4 years. There was no significant change in the incidence of eclampsia over four years. Nobis et al. also reported that there is no reduction in incidence of eclampsia in India over the decades.² It is appropriate to mention that our data is hospital based and hence does not reflect the entire population. Also following introduction of National Rural Health Mission (NRHM) and Government of India's Policy regarding hospital delivery, there is increase in the number of hospital delivery and that of eclampsia in hospital practice. Eclampsia usually follows preeclampsia; to prevent eclampsia, preeclampsia has to be prevented. Results of randomized clinical trials using different pharmacological agents failed to show definite benefit in preventing preeclampsia. Rate of eclampsia can be reduced with use of prophylactic magnesium sulfate. Findings of the Magpie Trial revealed that in women with imminent eclampsia the number of women to be treated to prevent one case of eclampsia was 36, and in those without symptoms the number of women to be treated to prevent one eclampsia was 129.²

6. Conclusion

Pre-eclampsia is one of the medical complications which occur during pregnancy and is responsible for significant fetomaternal morbidity and mortality. As pre-eclampsia cannot be fully prevented, diagnosis of high-risk patients and timely treatment can help prevent complications. As exact etiopathology of pre-eclampsia is still unknown more research is needed in understanding pre-eclampsia to plan effective strategy for predicting as well as preventing adverse outcomes. Education and empowerment of women is need of the hour. As doctor to patient ratio is below par, the role of ASHA workers is important. Government efforts to track all pregnancies will ensure adequate antenatal care especially to the socio-economically deprived and rural population. Incidence of eclampsia in India is remaining same over the decades though maternal mortality has shown slight reducing trend. Unchanged incidence is likely to be influenced by social adversities. Use of $MgSO_4$ in all cases of eclampsia may reduce the death rate. $MgSO_4$ should be used in all cases of imminent eclampsia to avoid missed opportunities. Doctors working in peripheral

Table 11: Comparison of maternal complications in present study versus earlier studies

Maternal Complication	Raji C. et al ⁵	Madhuri Ch. et al ⁸	Yucesoy G. et al ¹¹	Present study
ARDS	5.47%	0.76%	0.39%	0.65%
Pulmonary edema	1.36%	-	0.78%	1.29%
DIC	0.68%	0.8%	2.35%	0.97%
Renal failure	2.05%	0.57%	2.35%	1.94%
Abruptio placentae	4.10%	-	7.5%	3.83%
HELLP syndrome	3.42%	4.91%	2.35%	5.83%
ARF with DIC	0.68%	-	-	0.64%
HELLP with IVH	0.68%	-	-	0.68%
HELLP with ARF	1.36%	-	2.35%	1.29%
PPH	-	6.53%	-	4.53%

Table 12: Comparison of perinatal complications in present study versus study by Raji C. et al⁵

Perinatal complications	Raji C. et al ⁵	Present study
1. Prematurity	41.4%	40%
2. Respiratory Distress Syndrome	31%	29.86%
3. Birth Asphyxia	13.8%	13.04%
4. IUGR/ MAS	13.8%	17.10%

hospitals and midwives should have periodic training in the management of preeclampsia and eclampsia to avoid missed opportunities as well as better transport facilities are required to handle obstetric emergencies.

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8. Conflict of Interest

None declared.

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Author biography

Manjusha Jindal, Associate Professor & Unit Head

Dweep Jindal, Ex-Senior Resident, Associate Consultant

Viraj Naik, Senior Resident

Mrinalini Sahasrabhojane, Assistant Professor

Guruprasad Pednekar, Professor and Head

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