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Original Research Article

## Neuroimaging in eclamptic patients and its clinical implications

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### ABSTRACT

**Background:** Aim of the study is to assess the utility of neuroimaging (CT/MRI) in eclamptic patients and correlating their clinical implications and to study the role of Injection Mannitol in case of Eclampsia who did not respond to injection magnesium sulphate alone.

**Methods:** This prospective study was conducted in Pannadhay Mahila Chikitsalya Udaipur, RNT Medical College Udaipur, Rajasthan. 50 eclamptic patients fulfilling the inclusion and exclusion criteria were subjected to neuroimaging CT/MRI from August 2021 to August 2022. Injection Mannitol was added in eclamptic patients who did not respond to injection magnesium sulphate alone.

**Results:** In this study neuroimaging were normal in 42% cases while 58% cases had pathological changes; PRES, haemorrhage, infarction, ischemia etc. Out of these PRES was seen in 48% cases. Mannitol was given in 14% patients and only one patient did not respond to mannitol.

**Conclusions:** This study revealed that PRES was the main neurological component among patients. Neuroimaging helps in better management of eclampsia. Mannitol holds utility in managing the patients unresponsive to injection magnesium sulphate.

**Keywords:** Posterior reversible encephalopathy syndrome, Magnesium sulphate, Hypertensive disorders of pregnancy

### INTRODUCTION

Eclampsia remains one of the dreaded complications which may arise during the pregnancy or within 6 weeks after the delivery in postpartum period. The definition of eclampsia covers aspects of convulsions, among the pregnant women with background of hypertension (HDPs), primarily which involves pre-eclampsia and other laboratory findings most commonly proteinuria.<sup>1</sup> The prevalence of eclampsia remains varied from 0.5-15%.<sup>2,3</sup>

Eclamptic patients usually present with generalised tonic clonic seizures, the evaluation of which is mainly centered around the diagnosis of pre-eclampsia.<sup>4</sup> The core pathological process involved in eclampsia is the

neurological organ system. Such neurological complications are the primary concern which leads to a high mortality in eclampsia.<sup>5</sup> The neurological complications involved in eclampsia include seizures, confusion of the mind, visual field defects, blurring of vision, headache, hemiparesis, coma, cortical blindness and papilledema.<sup>6</sup>

PRES is a neuro-radiological entity described by Hinchey et al (1996).<sup>7</sup> Neuroimaging have revolutionized the visualization of brain pathology in eclamptic. CT is an initial imaging tool while some cases are followed by MRI.<sup>8</sup> The role of injection Mannitol was studied in refractory cases of eclampsia towards injection magnesium sulphate alone.

## METHODS

This prospective observational study was carried out in the department of obstetrics and gynaecology of Pannadhay Rajkiya Mahila Chikitsalaya, R. N. T. Medical College Udaipur from August 2021 to August 2022. Clearance from institutional ethics committee was obtained before the study was started.

A total of 50 patients were included in the study by systematic random sampling as per inclusion and exclusion criteria. Patient/attendants who gave written informed consent were included in the study.

### Inclusion criteria

Eclamptic patients (Antepartum, intrapartum and postpartum) with at least 1 episode of GTCS with gestation >20 weeks or <6 weeks postpartum with SBP >140 and DBP >90 or BP increase by 15-25mm of Hg compared to prepregnant state with urine albumin  $\geq$ 1 by dipstick method.

### Exclusion criteria

Women who were known case of HTN and epilepsy, pre-eclampsia patients, seizures due to metabolic derangements, space occupying lesions, intracerebral infections, uremic and hepatic encephalopathy and other systemic involvements; patients with history of migraine, with any drug allergy; having metallic implant anywhere in the body; claustrophobic; patient/attendants not willing to participate in the study.

### Study protocol

After ethical committee approval, this study was conducted in 50 eclamptic patients. After eliciting detailed history and proper clinical and neurological examination, patients were first stabilised with injection MgSO<sub>4</sub> and antihypertensives. The patients' details were recorded as per proforma. All relevant investigations like CBC, LFT, RFT, coagulation profile, urine analysis and fundoscopy were done. Then patients were subjected to neuroimaging CT/MRI as per status of patients. MRI was exclusively done in Antepartum/Intrapartum eclamptic. Patients who did not respond to injection MgSO<sub>4</sub>, injection Mannitol was added. The data thus obtained was entered in a pre-designed proforma.

### Statistical analysis

Data entry was done in the Microsoft excel spreadsheet and final analysis was done with use of SPSS software version 21.0.

## RESULTS

Majority of eclamptic patients were primigravida (56%). In our study onset of eclampsia occurred near term. In

majority of patients type of eclampsia was Intrapartum (42%) followed by antepartum (36%) and postpartum (30%). 74% patients were oriented at the time of admission. Most of the patients had >2 seizures. Mean value of SBP and DBP was 160 and 108 respectively.

**Table 1: Distribution of gravida of study subjects.**

Gravida	Frequency	Percentage
G1	28	56.00%
G2	11	22.00%
$\geq$ G3	11	22.00%
<b>Total</b>	<b>50</b>	<b>100.00%</b>

Majority of patients were primigravida (56%), 11 patients each were of gravida 2 and  $\geq$ G3 out of 50 patients.

**Table 2: Distribution of CT/MRI findings of study subjects.**

CT/MRI	Frequency (out of 50)
Normal	21
PRES	24
Infarction	2
Haemorrhage	1
Ischemia	1

PRES (48%) was most common finding in neuroimaging. In majority of patients 66% imaging modality was CT scan without contrast. Parietal lobe was most commonly site involved.

**Table 3: Distribution of study subjects as per treatment given.**

Treatment given	Frequency (number)
MgSO <sub>4</sub>	46
Phenytoin	4
Mannitol	8
Levetiracetam	1

MgSO<sub>4</sub> was given in majority followed by others.

**Table 4: Distribution of the study subjects as per indication for use of mannitol.**

Indication for use of mannitol	Frequency	Percent
Uncontrolled seizures	5	62.50%
Cerebral oedema	2	25.00%
Persistent headache	1	12.50%

Out of these 8 patients, majority of patients responded well. Only 1 patient did not respond. 525 delivered vaginally. Most common maternal complication was HELLP syndrome (16%) followed by renal failure, pulmonary edema and intraventricular hemorrhage. 2 patients expired and cause of death was intraventricular

haemorrhage in one and other died because of MODS with PRES. Fetal outcome was good in our study. Maternal complications were significantly higher in patients with neurological changes.

## DISCUSSION

The prospective study was conducted on 50 eclamptic, wherein CT/MRI was done to determine the neurological changes and complications.

The demographic characteristics of the patients showed that the mean age of the patients was 25.02 years with standard deviation of 4.5 years, with majority being primigravida (56%). Fisher et al found that younger maternal age was a risk factor for development of PRES among eclamptic patients.<sup>9</sup> The mean gestational age of patients at presentation was 36.46 weeks. Eclampsia type showed that 36% cases had antepartum eclampsia, 30% postpartum eclampsia and 42% cases had intrapartum eclampsia. In a comparative study by Ajah et al, age of the women was >20 years in 50% patients. 59.4% patients were nullipara and 40.6% were  $\geq 1$  para. APE and PPE were present in 46.1% and 22.5% women respectively.<sup>10</sup>

In our study 58% eclamptic patients had pathological changes in neuroimaging with 48% having PRES. A study by Eswari S et al neurological changes reported in 61% cases and 27% having PRES.<sup>11</sup> In majority of patients clinical presentation was headache(64%) followed by vomiting, pain upper abdomen, and blurring of vision. A study by Begum F et al reported that in 35 women with eclampsia, who underwent CT scan, changes in brain were present in 85.72% patients, and 14.28% patients were without changes.<sup>12</sup> Ugran SM et al also found significant CT scan findings in 52 patients out of 100 patients of eclampsia.<sup>13</sup> Mayama et al reported that in 4,849 pregnant women, PRES was present in 92.3% of eclamptic patients.<sup>14</sup>

In the present study treatment given was MgSO<sub>4</sub> in majority (92%). Mannitol was added in 8 patients out of these only 1 patient did not respond. Considering efficacy of mannitol, it is definitely recommended when convulsions are not controlled with MgSO<sub>4</sub> alone.<sup>8</sup>

In the present study mode of delivery was caesarean section in 48% and vaginal in 52%. Maternal complication were HELLP syndrome in 16%, renal failure in 4%, pulmonary oedema in 4% and intraventricular haemorrhage in 1 patient. Preterm delivery occurred in 38% patients.<sup>2</sup> women died during study duration. In comparison, Thomas DR et al found that in 12 women with eclampsia; ICU admission and assisted ventilation was needed in 41.7% and 8.3% patients respectively.<sup>15</sup>

## Limitations

Although the sample size was good, but being a single centered hospital-based study, the results of association of

neurological findings on CT/MRI with fetomaternal outcomes in such women may need further research. Our study was conducted in a setting which caters to patients belonging primarily to the lower or middle socioeconomic strata and the data primarily reflects the situation in this cohort.

## CONCLUSION

This study concluded that neuroimaging in eclampsia helps in better management of eclampsia and can decide the prognosis of patients. Mannitol hold utility in managing the patients unresponsive to MgSO<sub>4</sub>.

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