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Original Research Article

# COMPARATIVE ASSESSMENT OF CT AND MRI IMAGING OF ECLAMPSIA WITH ITS CLINICAL PRESENTATION: A TEACHING HOSPITAL BASED STUDY

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ABSTRACT

**Background:** Eclampsia may be associated with neurological complications that require prompt evaluation. Computed tomography (CT) and magnetic resonance imaging (MRI) are commonly used to identify intracranial abnormalities in affected patients. This study aimed to assess CT and MRI findings in patients with eclampsia and examine their relationship with clinical presentation.

**Materials and Methods:** This hospital-based study included 36 female patients with clinically confirmed eclampsia presenting during the antepartum, intrapartum, or postpartum period. All patients underwent both CT and MRI of the brain. Clinical symptoms and imaging findings were recorded and compared. The findings were summarized using frequencies and percentages.

**Results:** Headache was the most common symptom, reported in 26 patients (72.2%), followed by recurrent seizures in 23 (63.9%) and visual complaints in 19 (52.8%). Both CT and MRI demonstrated positive findings in 26 patients, whereas both examinations were negative in 8 patients. In 2 patients (5.6%), CT findings were negative while MRI demonstrated abnormalities. No patient had positive CT findings with negative MRI findings. The overall agreement between the two modalities was 94.4%.

**Conclusion:** Both CT and MRI contributed to the evaluation of patients with eclampsia. MRI demonstrated abnormalities in two patients whose CT examinations were negative, suggesting that it may provide additional information in selected cases. Further studies using an appropriate reference standard are required to establish the comparative diagnostic performance of the two modalities.

**Keywords:** Eclampsia, computed tomography, magnetic resonance imaging, neurological manifestations, neuroimaging.

## INTRODUCTION

Eclampsia is a serious complication of pregnancy characterized by seizures occurring in association with pre-eclampsia or other hypertensive disorders of pregnancy. It may develop during pregnancy, labour, or the postpartum period and can lead to significant maternal morbidity. Neurological manifestations such as headache, recurrent seizures, visual disturbances, and altered sensorium may indicate cerebral involvement and warrant prompt evaluation.[1,2]

Cerebral abnormalities associated with eclampsia include vasogenic oedema, intracranial haemorrhage, and ischaemic changes. Posterior reversible encephalopathy syndrome (PRES) is an important neuroimaging finding in these patients. However, other conditions, including cerebral venous thrombosis and infarction, may present with similar symptoms, making imaging important in identifying the underlying abnormality.[3,4]

Computed tomography (CT) is commonly used for the initial assessment of acute neurological symptoms because it is rapid and can identify major structural abnormalities, particularly intracranial

haemorrhage. Magnetic resonance imaging (MRI), particularly T2-weighted and fluid-attenuated inversion recovery (FLAIR) sequences, provides better characterization of cerebral oedema and subtle parenchymal changes. Previous studies have evaluated CT and MRI findings in eclampsia and their relationship with clinical manifestations, highlighting the importance of correlating imaging findings with the patient's presentation.[3,4]

The association between eclampsia and cerebrovascular abnormalities has also been explored in studies of atypical eclampsia and peripartum neurological complications.[5,6] Further studies have examined the prevalence of PRES and compared CT and MRI findings in patients with eclampsia.[7,8] A systematic review has additionally highlighted the frequency and varied distribution of PRES in pregnant women with severe pre-eclampsia and eclampsia.[9] Other prospective research has described a range of imaging abnormalities, including cerebral venous thrombosis, infarction, PRES, and hypertensive leukoencephalopathy.[10]

The present study aimed to assess CT and MRI findings in patients with eclampsia and examine their relationship with clinical manifestations. By evaluating both modalities in the same patients, the study sought to compare their observed findings and explore their complementary roles in the assessment of cerebral involvement.

## MATERIALS AND METHODS

The present hospital-based study was conducted in the Department of Radiology, in collaboration with the Department of Obstetrics and Gynaecology, at World College of Medical Sciences Research and Hospital, Jhajjar, Haryana. The study included 36 female patients with clinically confirmed eclampsia presenting during the antepartum, intrapartum, or postpartum period.

Institutional Ethics Committee approval was obtained, and written informed consent was taken from the participants after explaining the study protocol. The exclusion criteria included a history of other systemic illnesses, known causes of seizures or intracranial lesions, metallic implants, and claustrophobia, as documented in the original study protocol.

All 36 patients underwent both CT and MRI examinations of the brain. Clinical manifestations and imaging findings were recorded and compared to assess similarities and differences in the detection of intracranial abnormalities. The documented clinical manifestations included headache, seizures, visual complaints, speech abnormalities, and gait disturbances.

**Statistical Analysis**

Data were analysed using descriptive statistical methods. Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized using the mean and standard deviation, wherever appropriate. CT and MRI findings were compared using a cross-tabulation, and the overall agreement between the two modalities was calculated. No independent reference standard was documented for determining the diagnostic accuracy of either modality.

## RESULTS

A total of 36 female patients with clinically confirmed eclampsia were included in the study. The patients presented during the antepartum, intrapartum, or postpartum period. All 36 patients underwent both computed tomography (CT) and magnetic resonance imaging (MRI) of the brain. The demographic characteristics and imaging examinations performed are summarized in [Table 1].

**Clinical presentation**

Headache was the most frequently reported neurological symptom, occurring in 26 patients (72.2%), followed by multiple seizure episodes in 23 patients (63.9%). Visual complaints were documented in 19 patients (52.8%), while a single seizure episode was reported in 10 patients (27.8%). Gait abnormality was observed in 2 patients (5.6%). The distribution of the documented neurological symptoms is presented in [Figure 1].

**Comparison of CT and MRI findings**

The comparison of CT and MRI findings is presented in [Table 2]. Both modalities demonstrated positive findings in 26 patients (72.2%). In 2 patients (5.6%), CT findings were negative, whereas MRI demonstrated abnormalities. Both CT and MRI were negative in 8 patients (22.2%). No patient had positive CT findings with negative MRI findings.

The overall agreement between CT and MRI findings was 94.4% (34 out of 36 patients). These findings indicate that MRI demonstrated abnormalities in two patients whose CT examinations were negative.

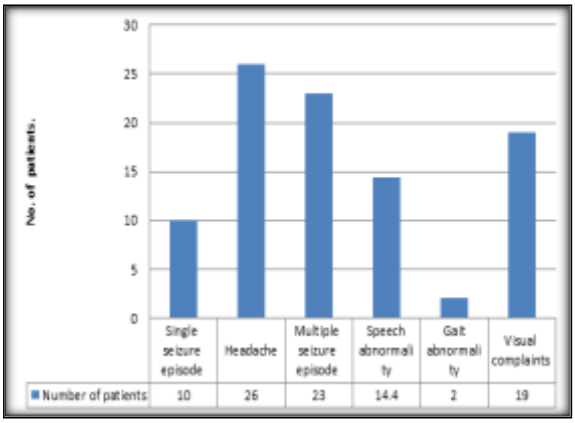



**Figure 1: Distribution of Neurological symptoms among eclampsia patients**

**Table 1: The demographic profile and imaging modality distribution**

| Parameter | Value |
|---|---|
| Total patients | 36 |
| Age range (years) | 20 – 30 |
| Mean age (years) | 24.2 ± 6.42 |
| CT brain performed | 36(100%) |
| MRI brain performed | 36(100%) |

**Table 2: Comparison of CT and MRI findings in patients with eclampsia**

| CT findings | MRI findings | | Totaln(%) |
|---|---|---|---|
| | MRI positive, n (%) | MRI negative, n (%) | |
| CT positive | 26(72.2%) | 0 (0%) | 26(72.2%) |
| CT negative | 02 (5.6%) | 08 (22.2%) | 10(27.8%) |
| Total | 28 (77.8%) | 08(22.2%) | 36 (100%) |

## DISCUSSION

Eclampsia is an important cause of neurological complications during pregnancy and the postpartum period. Its clinical manifestations may include headache, recurrent seizures, visual disturbances, and altered sensorium. Neuroimaging plays an important role in identifying cerebral abnormalities and evaluating patients with neurological symptoms.[1–4]

In the present study, headache was the most common neurological symptom, occurring in 26 patients (72.2%), followed by multiple seizure episodes in 23 patients (63.9%) and visual complaints in 19 patients (52.8%). These findings highlight the importance of recognizing neurological symptoms in patients with eclampsia and considering appropriate imaging to assess possible cerebral involvement. Brewer et al. reported a high prevalence of posterior reversible encephalopathy syndrome (PRES) among patients with eclampsia who underwent neuroimaging, further emphasizing the frequency of cerebral abnormalities in this clinical setting.[7]

Comparison of CT and MRI findings showed concordant results in 34 of the 36 patients (94.4%). Both modalities demonstrated abnormalities in 26 patients, while two patients had negative CT findings but positive MRI findings. Eight patients had negative findings on both examinations. The detection of abnormalities on MRI in two patients with negative CT findings suggests that MRI may demonstrate cerebral changes that are not apparent on CT in some patients. However, the observed agreement does not establish the diagnostic accuracy or superiority of either modality because an independent reference standard was not documented.

Chang et al. evaluated CT and MRI findings in eclampsia and their relationship with neurological symptoms, highlighting the importance of correlating imaging findings with clinical presentation.[3]Hiremath et al. described a range of causes of postpartum headache and seizures, including eclamptic encephalopathy and cerebral venous thrombosis.[4] Their findings emphasize the need to consider alternative diagnoses when neurological symptoms are persistent, recurrent, or atypical.

Neuroimaging is particularly valuable when the clinical presentation is unusual or does not follow the expected course. Patil discussed the role of neuroimaging in atypical eclampsia, while Lakhdar et al. described various cerebrovascular abnormalities occurring during the peripartum period.[5,6] These studies support the role of imaging in evaluating patients with neurological manifestations and identifying complications that may require specific management.

Brewer et al. identified PRES in 46 of 47 patients with eclampsia who underwent neuroimaging.[7] Jindal et al. also compared CT and MRI findings in eclampsia and examined their correlation with neurological presentation.[8] In a systematic review, Tawati and Chan reported PRES in 176 of 342 imaged women with eclampsia across the included studies and highlighted the variable distribution of cerebral abnormalities.[9] These findings provide important context for the use of neuroimaging in eclampsia. However, because lesion-specific findings were not available in the present study, direct comparison of PRES prevalence between these studies and our cohort is not possible.

A prospective observational study by Mohapatra et al. described several imaging abnormalities in eclamptic encephalopathy, including cerebral venous thrombosis, infarction, PRES, and hypertensive leukoencephalopathy.[10] This further illustrates that neurological manifestations in eclampsia may be associated with different underlying cerebral pathologies and that imaging can help characterize these abnormalities.

The findings of the present study support the complementary roles of CT and MRI in the evaluation of eclampsia. CT provides a rapid initial assessment and is useful when an acute intracranial haemorrhage is suspected, whereas MRI offers more detailed characterization of cerebral oedema and other parenchymal abnormalities. The identification of MRI abnormalities in two patients with negative CT findings suggests that MRI may provide additional information in selected cases. Nevertheless, these findings should be interpreted cautiously and do not independently establish the superiority of MRI.

This study has limitations, including its small sample size and single-centre design. Although CT and MRI showed high agreement, the absence of an independent reference standard limits assessment of their diagnostic accuracy. Further studies involving larger cohorts, detailed lesion-wise analysis, and appropriate reference standards are needed to clarify the comparative diagnostic performance of CT and MRI in eclampsia.

## CONCLUSION

In this study, CT and MRI findings showed agreement in 34 of 36 patients with eclampsia. MRI identified abnormalities in two patients whose CT scans were negative, suggesting that it may detect findings not evident on CT. CT remains useful for rapid initial assessment, particularly when acute intracranial haemorrhage is suspected, while MRI provides more detailed evaluation of cerebral abnormalities. The modalities should be considered complementary, with imaging choice guided by the clinical presentation and availability. Larger prospective studies are required to establish their comparative diagnostic performance.

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