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# Clinical and imaging profile of patients with new-onset seizures & a presumptive diagnosis of eclampsia – A prospective observational study

Vandana Bojja[a], Anish Keepanasseril[a,*], Pradeep P. Nair[b], V.C. Sunitha[c]

[a] Department of Obstetrics & Gynecology, Jawaharlal Institute of Post-graduate Medical Education & Research, Puducherry 605006, India
[b] Department of Neurology, Jawaharlal Institute of Post-graduate Medical Education & Research, Puducherry 605006, India
[c] Department of Radiodiagnosis, Jawaharlal Institute of Post-graduate Medical Education & Research, Puducherry 605006, India

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ABSTRACT

*Objective:* To study the clinical and imaging profile of patients with new-onset seizures with a presumptive diagnosis of eclampsia.

*Methods:* This was a cross-sectional study, conducted in a tertiary teaching hospital, on pregnant women presenting with new onset seizures with presumptive diagnosis of eclampsia excluding those with pre-existing neurological conditions. Demographic details, medical and obstetric examination findings were noted. All women underwent neuroimaging within 5 days of onset seizures.

*Results:* Presumptive diagnosis of eclampsia was made in 0.7% (n = 186) of women delivering during the time period. Most women (55.4%) presented with seizures in the antenatal period. Neuroimaging is performed in 130 cases and it was found to be abnormal in 45.4% of women (59/130). Most common associated neurological condition was Posterior Reversible Encephalopathy Syndrome in 20% (n = 26) followed by Cerebral Venosus Sinus Thrombosis in 10% (n = 14). All six women with primary intracerebral haemorrhage succumbed to the disease.

*Conclusion:* New-onset seizures may be the initial presentation of uncommon and unpredictable complication of pregnancy with serious maternal/ fetal morbidity and mortality. Neuroimaging will help in these patients to avoid the delay or misdiagnosis, resulting in early initiation of specific treatment which will help to improve and optimize outcomes.

## Key message

Neurological emergencies are uncommon and unpredictable complication of pregnancy with serious maternal/fetal morbidity and mortality. Neuroimaging will help to avoid the delay or misdiagnosis in these women, resulting in early initiation of specific treatment which will help to improve and optimize outcomes.

## 1. Introduction

Seizures occurring in pregnancy remains one of the major cause of serious maternal and fetal morbidity and mortality [1]. Since eclampsia is common, it remains as the default diagnosis of any patient presenting with new onset seizures in pregnancy and postpartum [2]. Other causes such as Intra-Cranial Hemorrhage (ICH), Sub Arachnoid Hemorrhage (SAH), Cerebral Venous Sinus Thrombosis (CVST) or Acute Ischemic stroke (AIS), needs a prompt diagnosis and institution of specific measures to decrease the risk of mortality and morbidity [2–5]. Because these conditions have overlapping symptoms and signs, neuroimaging place an important role in early diagnosis.

Posterior Reversible Encephalopathy Syndrome (PRES), a clinical and imaging syndrome caused by derangement in hemodynamics present in preeclampsia/eclampsia, is observed to be affecting an increased proportion of these women [2,4,6]. Recent studies have also noted conditions other than eclampsia to be associated with new onset seizures in pregnant women [3,4,7,8]. So, we aimed to study the clinical and imaging profile of patients presenting with new onset seizures in pregnancy who were managed with a presumptive diagnosis of eclampsia on admission.

*Abbreviations:* CVST, Cerebral Venosus Sinus Thrombosis; PRES, Posterior Reversible Encephalopathy Syndrome

* Corresponding author at: Department of Obstetrics & Gynecology, Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Dhanvantari Nagar, Pondicherry 605006, India.
*E-mail address:* keepanasseril.a@jipmer.edu.in (A. Keepanasseril).

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## 2. Methodology

This was a cross sectional study conducted in the Women and Children's Hospital attached to the Jawaharlal Institute of Postgraduate Medical Education & Research, Puducherry, India from September 2015 to August 2017. This is a tertiary care referral center which caters to the southeastern region of India with approximately 15,000 deliveries per year. We included all women more than 18 years presenting with new onset seizures in pregnancy with a presumptive diagnosis of eclampsia at admission excluding those women with pre-existing neurological conditions. New onset seizure was defined as occurrence of first seizure in the life of a person excluding the childhood febrile seizures. The study was approved by Institute Ethics Committee (Human Studies) (JIP/IEC/SC/2015/20/812).

Informed consent was obtained from those women or the guardian of those who were participating in the study. All women enrolled in the study underwent detailed medical and obstetric evaluation. Detailed neurological examination was also performed. Investigations such as complete blood count, platelet count, kidney function tests, liver function tests, serum electrolytes, blood sugar, coagulation profile and urine albumin were done and recorded.

All women included in the study were subjected to neuroimaging with Computer Tomography scanning (CT Scan) (Siemens SOMATOM spirit dual slice CT, Erlangen Germany) or Magnetic Resonance Imaging (MRI) of brain on 1.5 Tesla machine (Siemens Magnetom Avanto company, Erlangen Germany). Neuroimaging was done within 5 days of new onset seizures. All women who underwent imaging in the antenatal period underwent MRI scan and those in the postpartum underwent CT Scan. Angiography or venography was done along with the imaging when needed to confirm the diagnosis. All the images were reported by a radiologist and reviewed by the neurologist. Brain imaging results were classified as normal or abnormal. In cases of abnormal images, specific diagnoses were made based on characteristic imaging patterns.

All women in the study were started on magnesium sulphate therapy as per the Dhaka regime [9], considering eclampsia as the default diagnosis, till any other alternative diagnosis was made on imaging. If women continued to have seizures they were given a loading dose of intravenous phenytoin (20 mg/kg body weight) followed by 100 mg every 8 hourly. Intravenous labetalol 20 mg bolus, followed by 40 mg after 10 min, and 80 mg every 10 min up to a maximum dose of 220 mg was given for the control of blood pressure. Once alternative diagnosis is made on imaging, specific measures were instituted to optimize the outcome. Treating obstetrician decided the timing and mode of delivery based on the clinical circumstances and diagnosis. Details regarding labor and delivery and the perinatal outcome were also noted.

*Statistics analysis:* Data were analysed using STATA 13.0 (Stata Corp, USA). Categorical data are presented as percentages and continuous data as mean with standard deviation or median with range. Chi square or Fischer's exact test was used to compare the categorical data whereas Mann Whitney *U* or student *t* test was used to compare continuous variables. p value of $< 0.05$ was considered as significant.

## 3. Results

Of the 12,860 deliveries during the study period 208 pregnancies were complicated by seizures. We excluded 22 women with history of epilepsy. From the remaining 186 women who were considered to be eclampsia, imaging was performed in 130 (69.9%) women. We reported the findings from all these women who underwent imaging in the present study (Fig. 1). Table 1 shows the baseline characteristics of study population at the time of presentation with seizures. Mean gestational age at presentation with seizures was 36.6 ± 2.5 weeks (range 24.4–40.2 weeks). Except for three women included in the study, all had pre-eclampsia. First seizures occurred in the antenatal period in 72 women (55.4%), intrapartum in 26 women (20.0%) and postpartum in 32 women (24.6%). Majority of the women had neuroimaging within 72 h and all had within 5 days of presenting with seizures.

Computer Tomography (CT) imaging was done in 54 cases, MR imaging was in 57 cases and in 19 cases MRI was done after initial CT imaging for the confirmation of the diagnosis. Imaging was abnormal in 59 (45.4%) cases. In women with abnormal imaging, frontal region was involved in 20 (33.9%), temporal in 9 (15.2%), parietal in 21 (35.6%) and occipital in 28 (47.5%) cases. Involvement of cerebellum was noted in 2 (3.4%), brain stem in 1 (1.7%), periventricular region in 3 (5.1%) and deep grey matter in 5 (8.5%) patients.

Abnormal imaging was noted in 47.2% (n = 34/72) women with first seizures in antepartum, 38.5% (n = 10/26) in intrapartum and 46.9% (n = 15/32) in the postpartum (p = 0.730). More women with abnormal imaging had altered sensorium and focal neurological deficit at the time of presentation compared to those who had normal imaging as shown in Table 2. There was no difference in the both the groups based on the investigation at the time of presentation as shown in Table 3.

Table 4 shows the diagnosis of women with new-onset seizures following neuroimaging. Most common diagnosis was Posterior Reversible Encephalopathy Syndrome (PRES) in 26 (20%) cases; in all of them occipital region was involved. Other areas involved include parietal region in 16 (61.5%), temporal region in 8 (30.8%) and notably frontal region in 13 (50%) patients. Those with PRES had their blood pressure titrated with anti-hypertensives to less than 140/90 mmHg and did not receive any anti-epileptics. In three cases where pre-eclampsia was not present, 2 had granuloma and 1 had sclerosis in the temporal lobe in neuroimaging.

Cerebral Venous Sinus Thrombosis (CVST) was diagnosed in 10% women in the study (14/130); all these patients had superior sagittal sinus involvement along with lateral sinus in 4 cases (4/14, 28.6%) and transverse sinus in 2 cases (2/14, 14.3%). Nearly two third of them presented in the antenatal period (n = 10/14, 72%). All these women received full anticoagulation with low molecular weight heparin (enoxaparin) based on their body weight; and were discharged on Acenocoumarol (Tab Acitrom, Nicholas Piramal India Ltd.). Two women who underwent decompressive craniotomy, were discharged without any neurological deficit or complications.

Hemorrhages were present in 28 cases; 19 (14.6%) had micro hemorrhages, 7 (5.4%) had primary intra-parenchymal hemorrhage and 2 (1.5%) had sub-arachnoid hemorrhage. Of the nine women who had intracranial hemorrhage, eight of them occurred during the antepartum period. Of the seven cases with primary intra-parenchymal hemorrhage six had ventricular extension. Extra-ventricular drain was placed in these six patients with ventricular extension of the bleed to reduce the raised intracranial pressure. However, those (6/6) with primary intra-parenchymal hemorrhages did not survive. Three women each had infarct involving middle cerebral artery territory and subarachnoid hemorrhage, which were managed medically and was discharged on anti-epileptics.

## 4. Discussion

Abnormal imaging was noted in nearly half of the study population (n = 59, 45.4%) with PRES being the most common diagnosis. Occipital region was involved in all cases of PRES followed by parietal and other regions. All women who had intra-parenchymal hemorrhage did not survive, whereas all with CVST or PRES recovered during the study period. Those women who had abnormal neuroimaging had a higher chance of presenting with altered sensorium and focal neurologic deficits. There was no difference in the incidence of abnormal imaging based on the timing of first seizures in pregnant period.

Conventionally, new-onset of seizures in pregnancy is considered as eclampsia unless otherwise proved during antepartum period and up to first 48 h in the postpartum period. In low to middle income countries like India, the logistics and cost, limit the use of imaging in all patients