

Computed tomography of brain in eclampsia and its clinical correlation

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ABSTRACT

Objective: The aim of the study was to identify intracerebral lesion in computed tomography (CT) imaging of eclampsia and correlate them with clinical manifestations. **Methodology:** This prospective study was carried out in the high dependency unit (HDU) of department of obstetrics and gynaecology in a tertiary care hospital for a period of one year. Total 45 women were included and were divided into two groups: a) study group: abnormal CT findings, b) control group: normal CT findings. Comparison was done using chi-square test. **Results:** Out of 45 numbers of cases 33.33% (15 women) had changes in brain CT scan. We observed 10 cases of cerebral oedema, 3 cases of cerebral infarction, and 2 cases of cerebral hemorrhage. The blurring of vision, multiple numbers of seizures, altered sensorium and unconsciousness showed statistically significant difference between the study and control group. The most common lobe involvement was occipital lobe (14 cases). There were five numbers of maternal mortality among 45 cases. All the 2 cases who had intracerebral haemorrhage died. **Conclusion:** The dominant intracerebral finding of eclamptic patient was cerebral oedema. Blurring of vision, multiple number of seizures, altered sensorium and unconsciousness were warning clinical presentations for possible brain lesions in CT scan.

Keywords: Eclampsia, cerebral edema, CT scan.

The prevalence of eclampsia in developing countries like India is 0.5% that was observed in a randomised controlled trial undertaken between 1 April 2016 and 30 November 2017¹. The evaluation for eclampsia is centered around the diagnosis of preeclampsia. The definition for preeclampsia initially included proteinuria as a diagnostic requirement, but this is no longer the case as some patients had the advanced disease before proteinuria detection. Preeclampsia is defined as a new-onset of hypertension with systolic blood pressure greater than or equal to 140 mmHg and/or diastolic blood pressure greater than or equal to 90 mmHg after 20 weeks of gestation with proteinuria and/or end-organ dysfunction

(renal dysfunction, liver dysfunction, central nervous system disturbances, pulmonary edema, and thrombocytopenia)^{2,3}. Eclampsia is defined as the new onset of generalized tonic-clonic seizures in a woman with preeclampsia. Eclamptic seizures can occur antepartum, 20 weeks after gestation, intrapartum, and postpartum.

Women under 20 years of age, and primigravida are dominant risk factors⁴. Eclampsia is related to adverse outcomes including cerebral hemorrhage, stroke, seizures, cardiopulmonary compromise, renal failure, liver hematoma or rupture, placental abruption, preterm delivery and death. Cerebral complications are the major cause of death. The

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spectrum of brain involvement is wide, and these lesions include intracerebral hemorrhage, cerebral ischemia, and cerebral edema⁵. The intracerebral involvement can be better identified by using computed tomography (CT) imaging. The objectives of the present study were to correlate the computed tomography imaging findings and clinical presentation in eclampsia patients.

Materials and methods

This prospective study was carried out in the high dependency unit (HDU) of department of obstetrics & gynaecology in Fakhruddin Ali Ahmed Medical College during the period of January 2019 to December 2019 after getting the permission from institutional ethical committee. All cases of eclampsia admitted in HDU were included in the study except the known cases of seizure disorder, chronic hypertension, trauma, space occupying lesion of brain, seizures due to metabolic disturbances, intracerebral infections.

Detailed history including socio-demographic history, history of convulsion, obstetrical history and past medical history was elicited. General and systemic examination including neurological examination and investigations such as complete haemogram, urine albumin (by dipstick), liver function test, renal function test, absolute platelet count were done.

The selected women were sent to the radiology department for CT scanning of brain within 72 hours of admission. In antepartum cases CT scan were done after termination of pregnancy. If spontaneous delivery had not occurred then delivery of fetus was done either by induction of labour or caesarian section. All patients were treated with Pritchard regiment of MgSO₄ and proper monitoring such as urine output, knee jerk and respiratory rate was done.

Total 45 women were included according to inclusion criteria and were divided into two groups: a) study group: abnormal CT findings, b) control group: normal CT findings.

The data were expressed as rates, ratios and proportions and comparison was done using chi-square test. A probability value (p value) of less than 0.05 was considered as statistically significant.

Results

Total 45 numbers of women were included in the study. These women were divided in two groups. Study group

(n=15) consisted of eclamptic women having abnormal CT scan findings and control group (n=30) with no findings in CT scan. Dominant age in both groups was below 20 years. The mean age of the study population was 20.67±3.81years. No statistical significant difference observed in age wise distribution (p: 0.789) (table 1). In this study, 91.11% (n=41) women belonged to rural area. However geographical distribution in both groups was statistically non significant (p: 0.548). Most of the women were primigravida (75.55%).

Table 1: Table showing age, geographical distribution, parity and time of presentation

Parameters	Study Group CT findings present N=15		Control Group CT findings absent N=30	P value
	Age in years	<20	11	
	20-25	3	6	
	26-30	1	4	
	>30	-	1	
Geographic distribution	Rural	13	28	0.548
	Urban	2	2	
Parity	0	11	23	0.746
	1	2	5	
	2	2	2	
Time of presentation	Antepartum	8	20	0.586
	Postpartum	7	10	

Among all women 62.22% (28 women) presented as antepartum and 37.78% (17 women) presented as postpartum eclampsia (table 1). The distribution of parity and time of presentation was also statistically non significant.

In this study, the comparison of clinical presentations was done. Vomiting, frothing, headache and urinary incontinence did not show statistically significant difference between the study and control group. There were statistically significant difference in clinical presentation like blurring of vision, number of convulsion, altered sensorium and

Table 2: Clinical presentation

Parameters	Study Group Ct findings present N=15		Control Group CT findings absent N=30	P value
	Vomiting	2	10	
Frothing	4	11	0.502	
Headache	5	15	0.228	
Blurring of vision	7	4	0.014	
Urinary incontinence	1	2	1.000	
2 convulsions	6	28	0.000	
3 or more convulsions	9	2	0.000	
Altered sensorium	5	1	0.005	
Unconscious	8	1	0.000	

unconsciousness between the two groups (table 2).

Out of 45 numbers of eclamptic women 33.33% (15 women) had changes in brain on CT scan. Among the types of lesion the dominant finding was cerebral oedema (10 cases) (figure 1) followed by cerebral infarction (3 cases) and cerebral haemorrhage (2 cases) (table 3).

In this study, the most common lobe involvement was occipital lobe (14 cases) followed by parietal (8 cases), temporal (7 cases), frontal (3 cases) (table 4). Most of the lesions showed bilateral distribution with involvement of different lobes.

Table 3: Types of cerebral lesion

Types	Number
Cerebral oedema	10
Cerebral infarction	3
Cerebral haemorrhage	2
Normal	30

On CT scan the dominant presentation was PRES (posterior reversible encephalopathy syndrome) (35.5%). Clinically other maternal complications such as pulmonary oedema, status eclampticus, PPH (postpartum haemorrhage), ARF (acute renal failure) and neurological deficit were

Table 4: Involvement of area of brain

Anatomical site	Number
Occipital lobe	14
Parietal lobe	8
Temporal lobe	7
Frontal lobe	3

observed in 2(4.44%), 2(4.44%), 1(2.22%), 1(2.22%) and 1(2.22%) cases respectively (table 5). Among 45 number of cases, 5 maternal deaths occurred which were due to pulmonary oedema (1 case), status eclampticus (1 case), cerebral haemorrhage (2 cases) and PPH (1 case). Four of the maternal death were belonged to study group and one belonged to control group. The cause of maternal death in control group was severe PPH.

Table 5: Maternal outcomes

Category	Number (%)
Pulmonary oedema	2(4.44%)
PRES	16(35.56%)
Status eclampticus	2(4.44%)
PPH	1(2.22%)
ARF	1(2.22%)
Neurological deficit	1(2.22%)

PRES - Posterior reversible encephalopathy syndrome, PPH – Postpartum haemorrhage, ARF – Acute renal failure

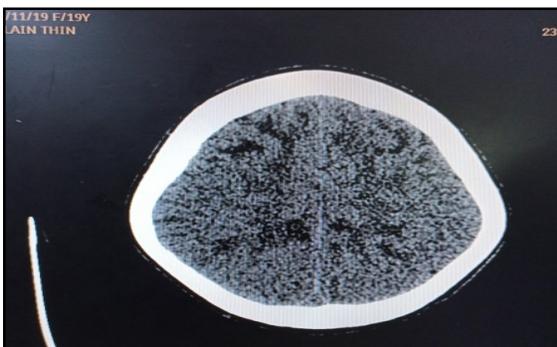


Figure 1: Ill defined hypodensities involving bilateral frontal and parietal lobes involving white matter – Cerebral oedema

Discussion

The mean age of eclamptic mother in this study was 20.67±3.81years. The dominant number of primigravida (75.55%) was in category of below 20 years. Existing literature suggests that teenage pregnant women are at greater risk of eclampsia⁶. These results were also similar to case series study of 30 eclamptic patient conducted by Jindal MA et al. They reported that the maximum number of eclamptic patient belonged to category of 20 to 25 years (60%)⁷. A study by Dahiya K et al reported that the mean age of eclamptic women 22.61±2.72 years which was comparable with the present study⁸. Another study by Robert A et al showed that incidence of pregnancy associated hypertension and eclampsia decreased with increased age during adolescence. They also observed that the incidence of eclampsia was significantly lower in gravida two (G2) than gravida one (G1)⁹.

This observation was comparable to our study. In this study, the distribution of antepartum and postpartum eclampsia was 62.22% (n= 28) and 37.78% (n=17) respectively. These findings were consistent with the study by Gurjar B et al⁸ who reported that most of their cases as antepartum eclampsia¹⁰. Similarly more number of antenatal eclampsia was observed in the study by Chakravarty A et al¹¹ and Majoko F et al¹².

In this study, the comparison of clinical presentations such as blurring of vision, two numbers of convulsions, ≥ 3 numbers of convulsions, altered sensorium and unconsciousness, showed statistically significant difference between the study and control group (p=0.014, p=0.000, p=0.000, p=0.005, p=0.000 respectively). The other clinical manifestations such as vomiting, frothing, headache and urinary incontinence did not show statistically significant difference. A study by Dahiya K et al reported significant difference between study group and control group regarding clinical manifestation such as unconsciousness, altered sensorium, headache, blurring of vision and seizures which was comparable with the present study². Another Bangladeshi study showed similar statistically significant difference between the two groups regarding headache and visual disturbance¹³. Chang WN et al in a Taiwanese study also found comparable CT scan findings in eclamptic patients with headache and blurring of vision¹⁴.

We observed 10 cases of cerebral oedema, 3 cases of cerebral infraction, and 2 cases of cerebral haemorrhage. The CT scan was normal in 30 eclamptic cases. Cerebral oedema was the predominant finding in our study. Similar

observation was found in a French study, which observed 14 patients of cerebral oedema in 19 eclamptic women¹⁵. However, our study findings were contrast with some other study. A study in Cote d'Ivoire¹⁶, had been found a prevalence of almost equal number of ischemic and oedematous lesions whereas an Indian study, observed a prevalence of ischemic lesion¹⁷.

In our study, the locations of brain involvement were variously associated (parieto-occipital, parietal-occipito-frontal, occipital, and temporal). The most common lobe involvement was occipital lobe (14 cases) followed by parietal (8 cases), temporal (7 cases), frontal (3 cases). Similarly in a study of 76 eclamptic women by McKinney AM et al, reported that the incidence of site of involvement was parieto-occipital 98.7% and temporal 68.4%¹⁸. In another study, Bartynski WS et al, described oedema in parietal or occipital regions 98% which was comparable with the present study¹⁹. However, in a study by Gurjar B et al reported that the most common lobe involved was parietal followed by occipital¹⁰.

In our study, the dominant presentation was posterior reversible encephalopathy syndrome (PRES) (35.5%). A study by Lakhdar R et al reported 61.4% of cases of posterior reversible encephalopathy PRES in eclamptic patient²⁰. Complications like pulmonary oedema, status eclampticus, PPH, ARF and neurological deficit were observed in 2(4.44%), 2(4.44%), 1(2.22%), 1(2.22%) and 1(2.22%) cases respectively. Among 45 number cases, 5 maternal deaths occurred which were due to pulmonary oedema (1 case), status eclampticus (1 case), cerebral haemorrhage (2 cases) and PPH (1 case). Four of the maternal death belonged to study group and one belonged to control group. The cause of maternal death in control group was severe PPH. Patients with cerebral haemorrhage had poor prognosis in our study. Indeed, 2 patients who had presented with intracerebral haemorrhage died. The literature reported that intracerebral haemorrhage during eclampsia has a poor prognosis compared to ischemic stroke²¹.

Conclusion

Cerebral oedema was the predominant finding in our study. The most common lobe involvement was occipital lobe. Blurring of vision, multiple number of seizures, altered sensorium and unconsciousness were warning clinical presentations for possible brain lesions in CT scan.

Conflict of interest: None. **Disclaimer:** Nil.

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