

ORIGINAL RESEARCH

## Clinico-radiological profile and outcome of patients with posterior reversible encephalopathy syndrome

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### ABSTRACT

**Background:** Posterior reversible encephalopathy syndrome (PRES) is usually diagnosed according to the presence of typical neuroimage showing vasogenic edema predominately involving the posterior brain area. Present study was aimed to study clinico-radiological profile and outcome of patients with posterior reversible encephalopathy syndrome at our tertiary hospital.

**Material and Methods:** Present study was retrospective, case-record based study, conducted in patients with clinical and imaging features suggestive of PRES.

**Results:** 32 case records were studied. Mean age was  $39.8 \pm 10.7$  years. Male (34.38 %) to female (65.63 %) ratio was 1: 0.52. Common clinical features noted were seizure (71.88 %), headache (68.75 %), altered mental status (59.38 %), vomiting (34.38 %), fever (25 %) & visual impairments (18.75 %). Eclampsia (50 %) was most common etiology for PRES, followed by hypertension (18.75 %), renal diseases (15.63 %), postpartum sepsis (9.38 %), poly-trauma (3.13 %) & cardiac disease (3.13 %). MRI Neuroimaging finding in study were involvement of parieto-occipital lobes (65.63 %), subcortical (46.88 %), frontal lobe (34.38 %), temporal lobe (18.75 %), asymmetric involvement of brain (18.75 %), cerebellum (12.50 %), basal ganglia (9.38 %), cortical (9.38 %), subarachnoid bleed (6.25 %), brainstem (3.13 %) & deep white matter (3.13 %), Mortality was observed in 2 cases (6.25 %) (both were antepartum eclampsia, reported to hospital in unconscious state & required intubation on admission). Good prognosis was noted in 30 cases (93.75 %). **Conclusion:** Early recognition of PRES is associated with good prognosis & good recovery, particularly if underlying etiology is treated satisfactorily.

**Keywords:** Eclampsia, PRES, hypertension, MRI imaging

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### INTRODUCTION

Posterior reversible encephalopathy syndrome (PRES) is also known as hyper perfusion encephalopathy, brain capillary leak syndrome or reversible posterior leukoencephalopathy syndrome. It is thought to occur due to an acute rise in blood pressure that overcomes the autoregulatory capacity of the cerebral circulation. This leads to disruption of the blood-brain barrier, and vasogenic edema.<sup>1</sup>

The clinical symptoms of PRES typically include encephalopathy, seizures, headache, visual symptoms, and focal neurologic deficits. The risk factors for developing PRES include hypertension, pregnancy and puerperal diseases, organ transplantation, immunosuppressive agents or cytotoxic agents, acute or chronic kidney disease, autoimmune diseases, infections, endocrine diseases, etc.<sup>2,3</sup>

PRES is usually diagnosed according to the presence of typical neuroimage showing vasogenic edema predominately involving the posterior brain area. With the widespread utilization of magnetic resonance imaging (MRI), PRES is becoming more perceptible in different medical fields.<sup>4</sup> Present study was aimed to study clinicoradiological profile and outcome of patients with posterior reversible encephalopathy syndrome at our tertiary hospital.

## MATERIAL AND METHODS

Present study was retrospective, case-record based study, conducted in Department of Medicine, Al Ameen Medical College, Vijayapur, India. Case records of patients with clinical and imaging features suggestive of PRES from January 2018 to December 2021(4 years) were studied. Study was approved by institutional ethical committee.

Medical records of all included patients were reviewed to know Clinical history, clinical features, etiological factors and neurological examination. In addition, clinical information regarding concurrent medical illnesses, immunosuppressive therapy, and other medications was extracted. Laboratory parameters including complete blood count and biochemical parameters such as renal function test, electrolytes, and liver function test were also reviewed. All MRI findings were reviewed. Medical records and. Magnetic resonance imaging (MRI) neuroimages of cases were studied, evaluated, and analysed to bring out, imaging findings including the distribution of lesions, predominant lobe involvement, and presence of restricted diffusion and microhemorrhages.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

## RESULTS

32 case records were studied. Mean age was  $39.8 \pm 10.7$  years. Male (34.38 %) to female (65.63 %) ratio was 1: 0.52. Common clinical features noted were seizure (71.88 %), headache (68.75 %), altered mental status (59.38 %), vomiting (34.38 %), fever (25 %) & visual impairments (18.75 %).

**Table 1: General characteristics**

Characteristics	Number of patients (n=32)	Percentage
Mean age (years)	$39.8 \pm 10.7$	
Gender		
Male	11	34.38%
Female	21	65.63%
Clinical features		
Seizure	23	71.88%
Headache	22	68.75%
Altered mental status	19	59.38%
Vomiting	11	34.38%
Fever	8	25.00%
Visual impairments	6	18.75%
Quadripareisis/ hemiparesis	2	6.25%

In present study, eclampsia (50 %) was most common etiology for PRES, followed by hypertension (18.75 %), renal diseases (15.63 %), postpartum sepsis (9.38 %), poly-trauma (3.13 %) & cardiac disease (3.13 %),

**Table 2: Etiology**

<b>Etiology</b>	<b>Number of patients (n=32)</b>	<b>Percentage</b>
Eclampsia	16	50.00%
Hypertension	6	18.75%
Renal diseases	5	15.63%
Postpartum sepsis	3	9.38%
Poly-trauma	1	3.13%
Cardiac disease	1	3.13%

MRI Neuroimaging finding in study were involvement of parieto-occipital lobes (65.63 %), subcortical (46.88 %), frontal lobe (34.38 %), temporal lobe (18.75 %), asymmetric involvement of brain (18.75 %), cerebellum (12.50 %), basal ganglia (9.38 %), cortical (9.38 %), subarachnoid bleed (6.25 %), brainstem (3.13 %) & deep white matter (3.13 %),

**Table 3: MRI Neuroimaging findings**

<b>Neuroimaging findings- Area involved</b>	<b>Number of patients (n=32)</b>	<b>Percentage</b>
Parieto-occipital lobes	21	65.63%
Subcortical	15	46.88%
Frontal lobe	11	34.38%
Temporal lobe	6	18.75%
Asymmetric involvement of brain	6	18.75%
Cerebellum	4	12.50%
Basal ganglia	3	9.38%
Cortical	3	9.38%
Subarachnoid bleed	2	6.25%
Brainstem	1	3.13%
Deep white matter	1	3.13%

Mortality was observed in 2 cases (6.25 %) (both were antepartum eclampsia, reported to hospital in unconscious state & required intubation on admission). Good prognosis was noted in 30 cases (93.75 %).

**Table 4: Outcome**

<b>Outcome</b>	<b>Number of patients (n=32)</b>	<b>Percentage</b>
Recovered	30	93.75%
Death	2	6.25%

## DISCUSSION

The typical imaging findings of PRES are most apparent as hyperintensity on FLAIR images in the parietooccipital and posterior frontal cortical and subcortical white matter; less commonly, the brainstem, basal ganglia, and cerebellum are involved. Atypical imaging appearances include contrast enhancement, hemorrhage, and restricted diffusion on MRI.<sup>5</sup>

Various other Imaging patterns described in PRES are holohemispheric watershed, superior frontal sulcus, dominant parietal/occipital, partial and/or asymmetric PRES.<sup>6</sup>

Goyal G et al.,<sup>7</sup> studied 30 patients, 18 were females and twelve patients were male. The Mean age of the patients was 38.6 years. The most common presentation was seizure (66.6%) followed by altered mental status (53.3%) and headache (40%). The Main comorbid illnesses in our study were renal disease (36.7%), hypertension (23.3%), eclampsia, and postpartum sepsis (26.7%). The Most common site was the occipito-parietal region in the magnetic resonance imaging brain (66%). Atypical presentation involved the temporal lobe (16%), basal ganglia (6%), and microhemorrhage (6%). The Outcome was good with 20% mortalities. Similar findings were noted in present study.

Thombarapu U et al.,<sup>8</sup> noted PRES in 16 out of 127 patients of preeclampsia. Among them, 14 presented with eclampsia, and two presented with severe preeclampsia and imminent symptoms of eclampsia. Headache was the most common symptom (100%). PRES occurred at a peak SBP of  $\geq 160$  mmHg in 75% cases and peak DBP of  $\geq 110$  mmHg in 50% cases. Serum lactate dehydrogenase (LDH) level was  $\geq 600$  in 56.25% and serum uric acid level  $\geq 6$  in 50% of patients of PRES. The drug of choice was magnesium sulfate.

Chen Z et al.,<sup>9</sup> conducted a systematic review and meta-analysis of Six studies with 448 cases. Hemorrhage was associated with high risk for poor outcome in patients with PRES. The pooled OR for hemorrhage, pre-eclampsia/eclampsia, cytotoxic edema was 4.93 (95% CI: 3.94–6.17;  $P < 0.00001$ ), 0.24 (95% CI: 0.15–0.40;  $P < 0.00001$ ) and 2.59 (95% CI: 0.84–7.99;  $P = 0.10$ ), respectively. PRES patients with hemorrhage or cytotoxic edema are likely to have poor outcomes. Preeclampsia/ eclampsia is associated with reduced risk of poor outcome in patients with PRES.

In study by Saurabh B et al.,<sup>10</sup> mean age was  $30.68 \pm 12.68$  years. The most common symptoms included altered sensorium (77.3%), headache (72.7%), seizures (63.6%), vomiting (36.4%), and visual disturbances (22.7%). About 94.5% of patients had parieto- occipital signal changes on neuroimaging. Magnetic resonance imaging (MRI) (n = 20) revealed involvement of sites considered atypical for PRES in 95% (frontal [55%], temporal [40%], cerebellum [40%], basal ganglia [15%], deep white matter [10%] and brainstem [10%]). Diffusion restriction, haemorrhage, and contrast enhancement were seen in 30%, 22.2%, and 25% of patients. At 3 months follow- up, modified Rankin scale was 0 in 19 patients and 1 in 1 patient. Two (9.1%) patients died. Eight (36.4%) patients had eclampsia, 5 (22.7%) each had chronic kidney disease and essential hypertension whereas 2 (9.1%) each had immune- mediated disorders and drug- induced PRES. None of the clinical or imaging features predicted outcome in PRES.

Praveen K Y<sup>11</sup> noted that most common precipitating cause was postpartum state (37.5%), Accelerated Hypertension (20.8%), chronic renal failure (16.6%), Pregnancy (12.5%) and chemotherapeutic agents (8.33%). More than 60% of postpartum and pregnant patients had normal blood pressure recordings. MRI scan showed parietooccipital involvement most commonly (62.5%), followed by diffuse involvement (33%), Asymmetric brain involvement (16.6%), Basal ganglia/thalamus and cerebellar involvement in 12.5% each. Haemorrhage and infarcts were seen rarely. Most of the patients improved with no residual imaging findings or neurological deficits. Early diagnosis with appropriate Imaging is very important to achieve good Neurological outcomes. Similar findings were noted in present study.

Early recognition of PRES is important for the timely institution of therapy, which typically consists of gradual blood pressure control and withdrawal of potentially offending agents. Although reversible by definition, secondary complications, such as status epilepticus, intracranial hemorrhage, and massive ischemic infraction, can cause substantial morbidity and mortality.<sup>12</sup>

Atypical MRI presentations are common and there is a need to keep a strong index of suspicion for diagnosis of PRES in appropriate clinical settings. Certain limitations of presents study were, retrospective nature, single-center based study & no long-term follow-up.

## CONCLUSION

Early recognition of PRES is associated with good prognosis & good recovery, particularly if underlying etiology is treated satisfactorily. Treating physician should know that uncommon occurrence and varied presentation of PRES can result in diagnostic difficulties & delay in treatment.

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