ISSN: 2320-9267

Indian Journal of Pharmaceutical and Biological Research (IJPBR)

Journal homepage: www.ijpbr.in

RESEARCH ARTICLE

A study on clinical correlation with MRI findings in severe preeclampsia and eclampsia patients

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ABSTRACT

Background: Preeclampsia and eclampsia are major hypertensive disorders of pregnancy and important causes of maternal and perinatal morbidity and mortality worldwide. Neurological complications resulting from cerebral involvement are among the most severe manifestations and contribute significantly to adverse maternal outcomes. Magnetic Resonance Imaging (MRI) has emerged as a valuable tool for identifying structural and functional brain abnormalities associated with these conditions, particularly Posterior Reversible Encephalopathy Syndrome (PRES), cerebral edema, and infarction.

Aim: To evaluate MRI findings in patients with severe preeclampsia and eclampsia and correlate these findings with neurological symptoms, blood pressure, laboratory parameters, gravida status, gestational age, Glasgow Coma Scale (GCS) score, and areas of brain involvement.

Methods: This prospective cross-sectional study was conducted among pregnant women diagnosed with severe preeclampsia and eclampsia admitted to a tertiary care hospital. Detailed clinical evaluation, neurological examination, blood pressure assessment, laboratory investigations, and MRI brain imaging were performed. MRI findings were analyzed and correlated with clinical and laboratory parameters.

Results: MRI abnormalities were observed predominantly among patients presenting with neurological manifestations such as seizures, headache, visual disturbances, and altered consciousness. The most common MRI finding was Posterior Reversible Encephalopathy Syndrome (PRES), followed by cerebral edema and ischemic changes. Significant correlations were observed between MRI abnormalities and severity of hypertension, neurological symptoms, and Glasgow Coma Scale scores. Brain involvement was most frequently noted in the parieto-occipital regions.

Conclusion: MRI serves as an effective diagnostic modality for detecting cerebral involvement in severe preeclampsia and eclampsia. Correlation of MRI findings with clinical and laboratory parameters facilitates early diagnosis, appropriate management, and improved maternal outcomes.

Keywords: Severe preeclampsia, eclampsia, MRI, PRES, cerebral edema, neurological manifestations.

Keywords:

Indian J. Pharm. Biol. Res. (2026): https://doi.org/10.30750/ijpbr.14.4.02

INTRODUCTION (≈350 WORDS)

Hypertensive disorders of pregnancy remain one of the leading causes of maternal and perinatal morbidity and mortality worldwide. Among these disorders, preeclampsia and eclampsia are particularly significant because of their multisystem involvement and potential for life-threatening complications. Hypertensive disorders complicate approximately 10% of pregnancies globally and account for nearly 14% of maternal deaths(1). Preeclampsia is characterized by the development of hypertension after 20 weeks of gestation, often accompanied by proteinuria and evidence of end-organ dysfunction involving the kidneys, liver, hematological system, and central nervous system. Eclampsia represents the occurrence of generalized seizures or unexplained coma in a patient with preeclampsia that cannot be attributed to other neurological causes. In India, the reported incidence of eclampsia is approximately 1.56%, with maternal mortality ranging from 2.2% to 9% and perinatal mortality ranging from 24.5% to 48%(2).

Although several organ systems are affected in severe preeclampsia and eclampsia, neurological complications remain the most serious and are responsible for nearly 40% of maternal deaths associated with these disorders(3). The exact pathophysiology underlying cerebral involvement is not fully understood; however, severe hypertension may impair cerebral autoregulation and disrupt the blood-brain barrier, resulting in vasospasm, endothelial dysfunction, and cerebral edema. These pathological changes may manifest

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How to cite this article: Dandpat AB, Das R, Pradhan P, Malik MK. A study on clinical correlation with MRI findings in severe preeclampsia and eclampsia patients. Indian J. Pharm. Biol. Res. 2026;14(4):4-20.

Source of support: Nil

Conflict of interest: None.

Received: 14/06/2026 **Revised:** 22/06/2026 **Accepted:** 24/07/2026

clinically as headache, visual disturbances, altered mental status, focal neurological deficits, and seizures(4).

Recent advances in neuroimaging have enhanced understanding of cerebral changes associated with hypertensive disorders of pregnancy. Posterior Reversible Encephalopathy Syndrome (PRES) is now recognized as a common clinicoradiological entity in eclampsia and severe preeclampsia. PRES is characterized by headache, confusion, visual disturbances, seizures, and reversible vasogenic edema predominantly affecting the posterior regions of the brain(5).

Magnetic Resonance Imaging (MRI) is currently the most sensitive modality for evaluating cerebral involvement in these patients. It provides detailed visualization of brain edema, ischemia, infarction, hemorrhage, and regional patterns of involvement. Early identification of such abnormalities can facilitate timely intervention and reduce maternal morbidity and mortality. Therefore, this study was undertaken to evaluate MRI findings in severe preeclampsia and eclampsia and to correlate these findings with neurological symptoms, blood pressure levels, laboratory parameters, gravida status, gestational age, Glasgow Coma Scale scores, and areas of brain involvement(6).

MATERIALS AND METHODS

Study Design

Prospective cross-sectional study.

Study Setting

The study was conducted in the Department of Obstetrics and Gynaecology in collaboration with the Department of Radiodiagnosis at a tertiary care teaching hospital.

Study Duration

The study was conducted over a period of 18 months.

Study Population

Pregnant women diagnosed with severe preeclampsia or eclampsia admitted during the study period.

Sample Size

All eligible patients fulfilling the inclusion criteria during the study period were included consecutively.

Inclusion Criteria

- Pregnant women diagnosed with severe preeclampsia.
- Pregnant women diagnosed with eclampsia.
- Patients willing to participate and provide informed consent.

Exclusion Criteria

- Known neurological disorders unrelated to hypertensive disorders of pregnancy.
- Chronic epilepsy.
- Intracranial space-occupying lesions.
- Contraindications to MRI examination.
- Patients unwilling to participate.

Data Collection

After obtaining informed consent, detailed demographic and obstetric information was recorded. Clinical assessment included:

- Age and gravida status.
- Gestational age.
- Blood pressure measurement.
- Glasgow Coma Scale (GCS) score.
- Presence of headache.
- Visual disturbances.
- Altered sensorium.
- Seizures and focal neurological deficits.
- Laboratory investigations included:
- Complete blood count.
- Liver function tests.
- Renal function tests.
- Urine protein estimation.
- Serum biochemical parameters relevant to severe preeclampsia and eclampsia.
- MRI Evaluation

All enrolled patients underwent MRI of the brain using standard imaging protocols. MRI sequences included T1-weighted, T2-weighted, FLAIR, diffusion-weighted imaging (DWI), and apparent diffusion coefficient (ADC) mapping. MRI findings were assessed for

- Presence of cerebral edema.
- Posterior Reversible Encephalopathy Syndrome (PRES).
- Ischemic changes or infarction.
- Hemorrhage.
- Distribution and area of brain involvement.

Outcome Measures

The primary outcome was correlation of MRI findings with

- Neurological symptoms.
- Blood pressure levels.
- Glasgow Coma Scale score.
- Gravida status.
- Gestational age.
- Laboratory parameters.
- Areas of brain involvement.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS software. Continuous variables were expressed as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages. Chi-square test, Fisher's exact test, and Student's t-test were used where appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

MRI Brain imaging performed on 50 patients with Eclampsia and severe preeclampsia. Analysis was done as per MRI findings and data collected from the 50 patients.

AGE IN YEARS

The most common age group in our study is in the range of 21-25 yrs. 29% of the patients were in the range of 21-25 y0rs. Only 9% of the patients were in the age group of more than 25 years.

Table-1: Age Distribution

Age (years)	*Frequency (n) (N=50)*	*Percent (%)*
18-20	12	24.0
21-25	29	58.0
26-35	9	18.0
TOTAL	50	100.0

Table-2: Age in Years * Mri Finding

Age in years		*MRI Finding*		*Total*	*P value*
		Normal	*Abnormal*		
18-20	Count	10	2	12	0.543
	% within Age in years	83.3%	16.7%	100.0%	
	% within MRI Finding	25.0%	20.0%	24.0%	
21-25	Count	24	5	29	
	% within Age in years	82.8%	17.2%	100.0%	
	% within MRI Finding	60.0%	50.0%	58.0%	
26-35	Count	6	3	9	
	% within Age in years	66.7%	33.3%	100.0%	
	% within MRI Finding	15.0%	30.0%	18.0%	

Table-3: Parity

Parity	*Frequency (n) (N=50)*	*Percent (%)*
Primigravida	37	74.0
Multigravida	13	26.0
Total	50	100.0

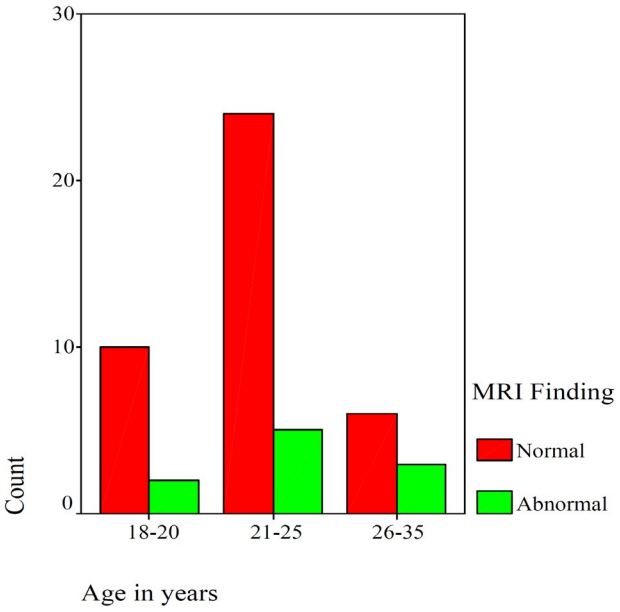


Figure 1 : Correlation between Age in years and MRI findings among study participants

Table-4: Parity* Mri Finding

Parity		*MRI Finding*		*P value*
		Normal	*Abnormal*	
Primi	Count	29	8	0.628
	% within Parity	78.38%	21.62%	
	% within MRI Finding	72.5%	80.0%	
Multi	Count	11	2	
	% within Parity	84.62%	15.38%	
	% within MRI Finding	27.5%	20.0%	

Table-5: Body Mass Index

Body Mass Index	*Frequency (n) (N=50)*	*Percent (%)*
Normal	27	54.0
Over weight	16	32.0
Obese	7	14.0
Total	50	100.0

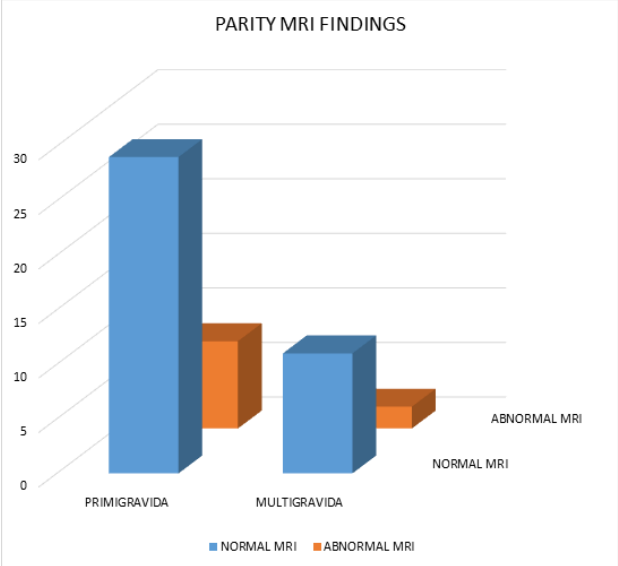


Figure 2 : Correlation between Parity and MRI findings among study participants

50% of the patients having abnormal MRI finding falls under the age group of 21-25 years, which is statistically not significant (p value is 0.543

Table-6: Bmi * Mri Finding

BMI		*MRI Finding*		*P value*
		Normal	*Abnormal l*	
Normal	Count	18	9	.036*
	% within BMI	66.7%	33.3%	
	% within MRI Finding	45.0%	90.0%	
Over weight	Count	15	1	
	% within BMI	93.8%	6.3%	
	% within MRI Finding	37.5%	10.0%	
Obese	Count	7	0	
	% within BMI	100.0%	.0%	
	% within MRI Finding	17.5%	.0%	

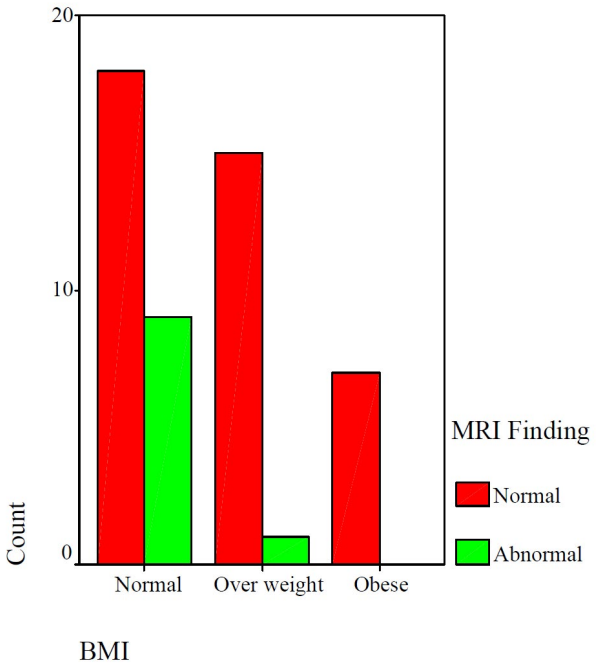


Figure 3: Correlation between BMI in years and MRI findings among study participants

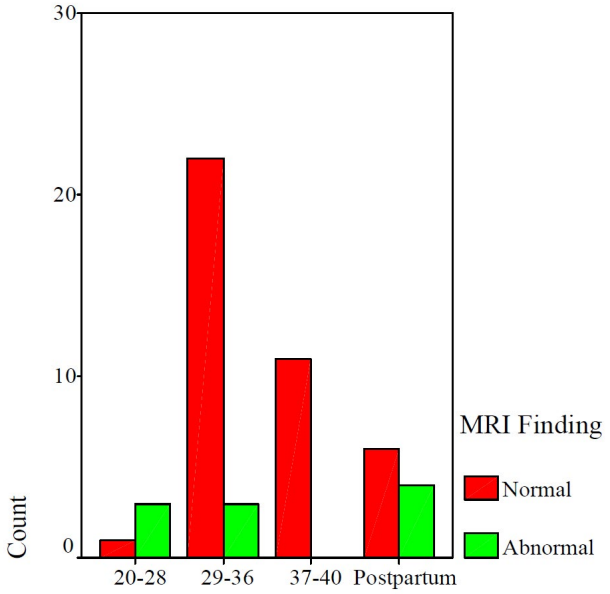


Figure 4: Correlation between Gestational age and MRI findings among study participants

Parity

Primigravida constitutes the majority in our study.74% of the patients were primigravida.

In my study group, 80% of the patients who have abnormal MRI findings were Primigravida which is not statistically significant (p value 0.628)

Body Mass Index

In my study group,54% of the patients have normal BMI.14 % of the patients are obese.

90% of the normal BMI patients have abnormal MRI findings. p value 0.036* which is statistically significant.

Gestational Age (In Weeks)

Most of the patients were in the antenatal period in my study group at the time of presentation in my study group

Table-7: Gestational Age

GA (weeks)	*Frequency (n) (N=50)*	*Percent (%)*
20-28	4	8.0
29-36	25	50.0
37-40	11	22.0
Postpartum	10	20.0
Total	50	100.0

50% percent of the patients falls between 29-36 weeks of gestational age.10% are postpartum patients.

In our study group, the gestational age between 20-28 weeks and 29-36 weeks has 30% of abnormal MRI findings each. But in the postpartum group, 40% of the patients have abnormal MRI findings. p value is 0.003, Significant.

Duration Of Hypertension Since Diagnosis

In our study, 62% of the patients with eclampsia and severe preeclampsia had hypertension diagnosed only at the time

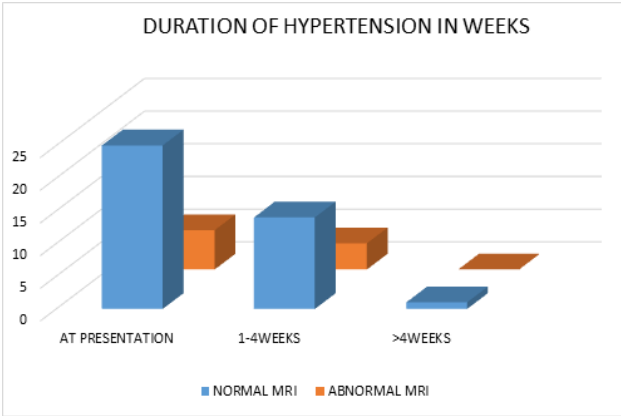


Figure 5 : Correlation between Duration since hypertension and MRI findings among study participants

Table-8: Gestational Age In Weeks * Mri Finding

GA in weeks		*MRI Finding*		*P value*
		Normal	*Abnormal*	
20-28 Weeks	Count	1	3	.003**
	% within GA in weeks	25.0%	75.0%	
	% within MRI Finding	2.5%	30.0%	
29-36 Weeks	Count	22	3	
	% within GA in weeks	88.0%	12.0%	
	% within MRI Finding	55.0%	30.0%	
37-40 Weeks	Count	11	0	
	% within GA in weeks	100.0%	.0%	
	% within MRI Finding	27.5%	.0%	
Postpartum	Count	6	4	
	% within GA in weeks	60.0%	40.0%	
	% within MRI Finding	15.0%	40.0%	

of presentation. Only 2% of the patients has hypertension for more than 4 weeks.

Duration Of Hypertension Since Diagnosis

Patients with Eclampsia and severe preeclampsia at the time of presentation, the onset of hypertension have abnormal MRI finding of 60%, p value is 0.575, which is statistically not significant.

Proteinuria

In our study group (table 6), 55% of the patients with normal MRI findings and 60% of the patients with abnormal MRI findings have proteinuria of 2+. p value is 0.455, which is statistically not significant.

Table-9: Duration Of Hypertension Since Diagnosis

Duration of HTN	*Frequency (n) (N=50)*	*Percent (%)*
At presentation	31	62.0
1-4 Weeks	18	36.0
> 4 Weeks	1	2.0
Total	50	100.0

Table-10: Duration In Weeks*Mri Finding

Duration in Weeks		*MRI Finding*		*P value*
		Normal	*Abnormal*	
At presentation	Count	25	6	0.575
	% within Duration in Weeks	80.65%	19.35%	
	% within MRI Finding	62.5%	60.0%	
1-4	Count	14	4	
	% within Duration in Weeks	77.8%	22.2%	
	% within MRI Finding	35.0%	40.0%	
> 4	Count	1	0	
	% within Duration in Weeks	100.0%	.0%	
	% within MRI Finding	2.5%	.0%	

Table-11: Urine Albumin

Urine Albumin	*Frequency (n) (N=50)*	*Percent (%)*
1+	9	18.0
2+	28	56.0
3+	13	26.0
Total	50	100.0

Table-12: Proteinuria * Mri Finding

Urine Albumin		*MRI Finding*		*P value*
		Normal	*Abnormal*	
1+	Count	8	1	0.455
	% within Urine Albumin	88.9%	11.1%	
	% within MRI Finding	20.0%	10.0%	
2+	Count	22	6	
	% within Urine Albumin	78.6%	21.4%	
	% within MRI Finding	55.0%	60.0%	
3+	Count	10	3	
	% within Urine Albumin	76.9%	23.1%	
	% within MRI Finding	25.0%	30.0%	

Imminent Symptoms

In our study group, 90% of the patients have imminent symptoms, 10% have no imminent symptoms.

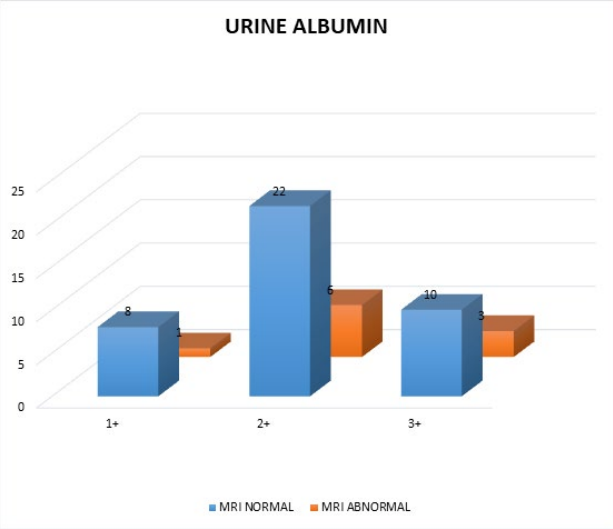


Figure 6 : Correlation between Urine albumin and MRI findings among study participants

Table -13: Imminent Symptoms

Imminent Symptoms	*Frequency (n) (N=50)*	*Percent (%)*
Present	45	90.0
Absent	5	10.0
Total	50	100.0

Table-14: Imminent Symptoms* Mri Finding

Imminent Symptoms		*MRI Finding*		*P value*
		Normal	*Abnormal*	
Present	Count	35	10	0.239
	% within Imminent Symptoms	77.8%	22.2%	
	% within MRI Finding	87.5%	100.0%	
Absent	Count	5	0	
	%within Imminent Symptoms	100.0%	.0%	
	%within MRI Finding	12.5%	.0%	

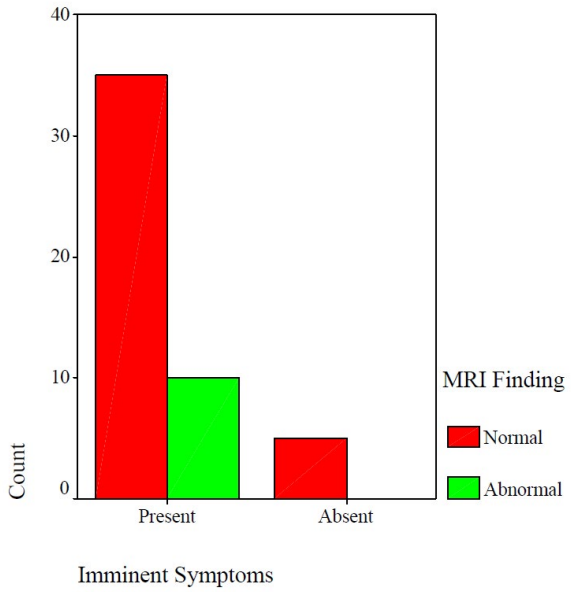


Figure 7: Correlation between Imminent symptoms and MRI findings among study participants

Table-15: Seizure

Seizures	*Frequency (n) (N=50)*	*Percent (%)*
Positive	40	80.0
Negative	10	20

Table-16: Seizure*Mri Finding

Seizure	*Normal*	*MRI finding* *Abnormal*		*p value*
Positive	Count	31	9	0.376
	% within Seizure	77.5%	22.5%	
	% within MRI Finding	77.5%	90.0%	
Negative	count	9	1	
	%within seizure	90.0%	10.0%	
	% within MRI finding	22.5%	10.0%	

Table-17: Past History

	Frequency (n) (N=50)	*Percent (%)*
Absent	10	100.0

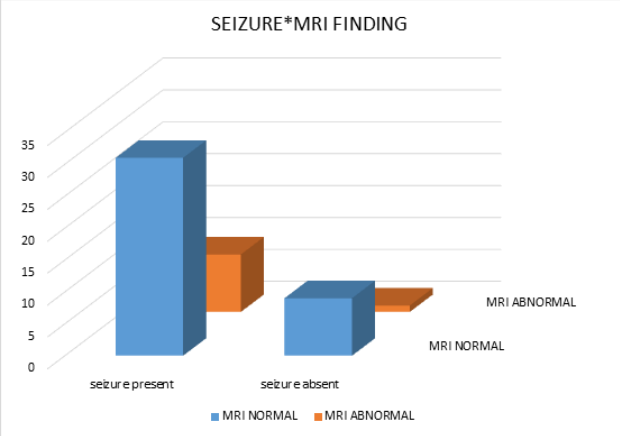


Figure 8: Correlation between Seizure and MRI findings among study participants

Table-18: Glasgow Coma Score

	Frequency (n) (N=50)	*Percent (%)*
GCS 13-15	29	58.0
10-12	13	26.0
≤9	8	16.0
Total	50	100.0

In our study group, 22.2% of the patients with Imminent symptoms have 100% of abnormal MRI finding. Remaining 77.8% with Imminent symptoms have 87.5% Normal MRI findings. p value = 0.239, which is statistically not significant.

Seizure

- In our study group, 80% patients had seizures.
- 90% of the patients having abnormal MRI findings had seizure. p value is 0.376, which is statistically not significant.

Table-19: Glasgow Coma Score * Mri Finding

GCS SCORE		*MRI Finding* *Normal*	*Abnormal*	*P value*
13-15	Count	28	1	.001**
	% within GCS score	96.6%	3.4%	
	%within MRI Finding	70.0%	10.0%	
10-12	Count	9	4	
	% within GCS score	69.2%	30.8%	
	% within MRI Finding	22.5%	40.0%	
≤9	Count	3	5	
	within GCS score	37.5%	62.5%	
	within MRI Finding	7.5%	50.0%	

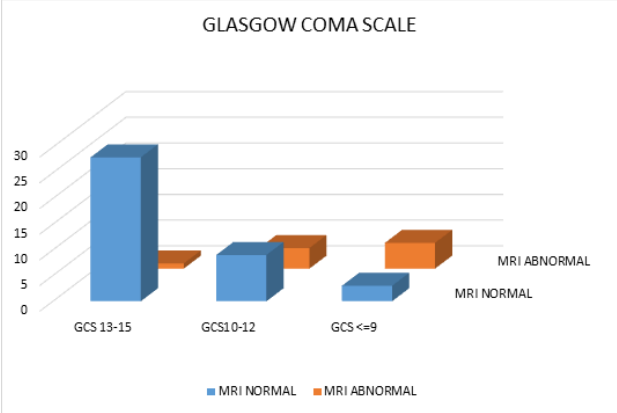


Figure 9: Correlation between Glasgow coma score and MRI findings among study participants

Past History

In our study all multigravida with Eclampsia and severe preeclampsia patients do not have significant past history in previous pregnancy.

Table-20: SBP

	Frequency (n) (N=50)	*Percent (%)*
< 140	1	2.0
140-160	33	66.0
161-200	16	32.0
Total	50	100.0

Table-21: Sbp * Mri Finding

SBP		MRI Finding		P value
		Normal	Abnor mal	
< 140	Count	1	0	.015**
	% within SBP	100.0%	.0%	
	% within MRI Finding	2.5%	.0%	
140-160	Count	30	3	
	% within SBP	90.9%	9.1%	
	% within MRI Finding	75.0%	30.0%	
161-200	Count	9	7	
	% within SBP	56.3%	43.8%	
	% within MRI Finding	22.5%	70.0%	

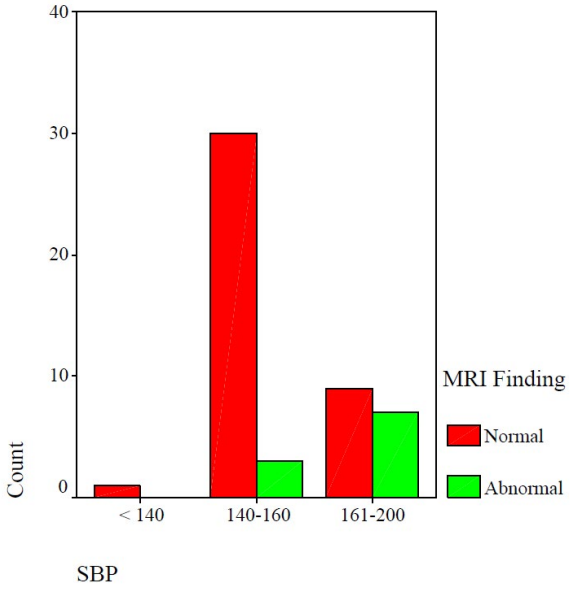


Figure 10: Correlation between Systolic blood pressure and MRI findings among study participants

Glasgow Coma Score

Among the patients presenting with Eclampsia and severe preeclampsia, 29 patients were in the range of GCS 13-15,13 were in the range of 10-12 and only 8 had GCS ≤9.

In the study group, 10% of patients had GCS between 13-15, 30.8 % of patients had GCS between 10-12, 50% of patients had GCS ≤9 with abnormal MRI findings. p value is 0.001, which is statistically significant.

Systolic Blood Pressure

Most of patients in our study group have systolic blood pressure in the range of 140-160 mmHg. only 2% have SBP of <140 mmHg.

In the study group, 70% of the patients who have abnormal MRI findings have systolic blood pressure in

Table-22: Dbp

	Frequency (n) (N=50)	*Percent (%)*
90-100	17	34.0
101-110	9	18.0
> 110	24	48.0
Total	50	100.0

Table-23: Dbp * Mri Finding

DBP		*MRI Finding*		*P value*
		Normal	*Abnormal*	
90-100	Count	13	4	.746
	% within DBP	76.5%	23.5%	
	% within MRI Finding	32.5%	40.0%	
101-110	Count	8	1	
	% within DBP	88.9%	11.1%	
	% within MRI Finding	20.0%	10.0%	
> 110	Count	19	5	
	% within DBP	79.2%	20.8%	
	% within MRI Finding	47.5%	50.0%	

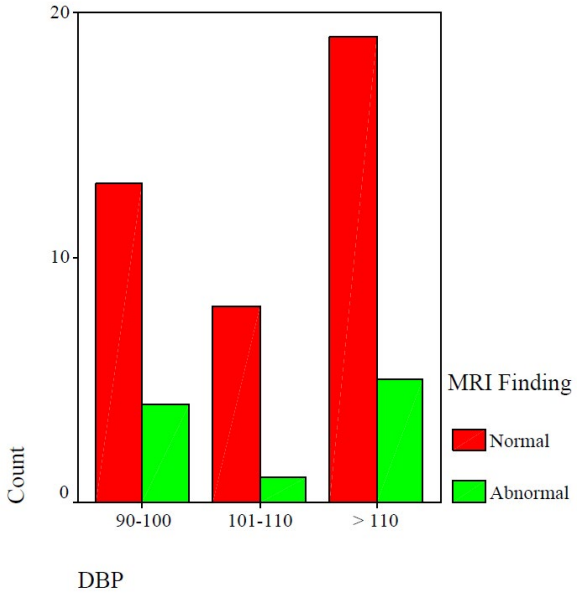


Figure 11: Correlation between Diastolic blood pressure and MRI findings among study participants

the range of 161-200mmHg. (p value is 0.015**) which is statistically significant.

Diastolic Blood Pressure

Out of 50 patients in our study group, 48% patients have diastolic blood pressure of more than 110 mmHg. Only 18% have diastolic blood pressure in the range of 101-110 mmHg.

In my study group, 50% of patients with abnormal finding have diastolic blood pressure >110 mmHg. p value is 0.746 which is not significant.

Mean Arterial Pressure

In our study group, 33 patients have their mean arterial pressure >126, where only 8 people have mean arterial pressure in the range of 96- 116.

In my study group, 80% of the patients with abnormal MRI finding have Mean arterial pressure of >126 mmHg. p value is 0.578, not significant.

Table-24: Mean Arterial Pressure

	Frequency (n) (N=50)	*Percent (%)*
96-116	8	16.0
116-126	9	18.0
> 126	33	66.0
Total	50	100.0

Table-25: Map * Mri Finding

MAP		*MRI Finding*		*P value*
		Normal	*Abnormal*	
96-116	Count	7	1	.578
	% within MAP	87.5%	12.5%	
	% within MRI Finding	17.5%	10.0%	
116-126	Count	8	1	
	% within MAP	88.9%	11.1%	
	% within MRI Finding	20.0%	10.0%	
> 126	Count	25	8	
	% within MAP	75.8%	24.2%	
	% within MRI Finding	62.5%	80.0%	

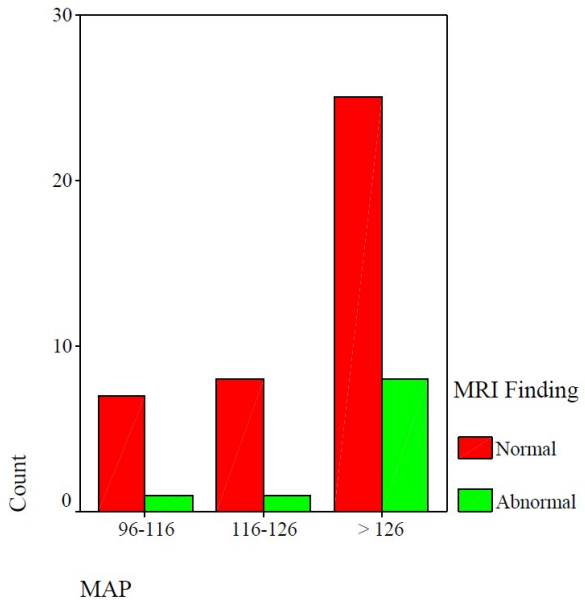


Figure 12 : Correlation between Mean arterial pressure and MRI findings among study participants

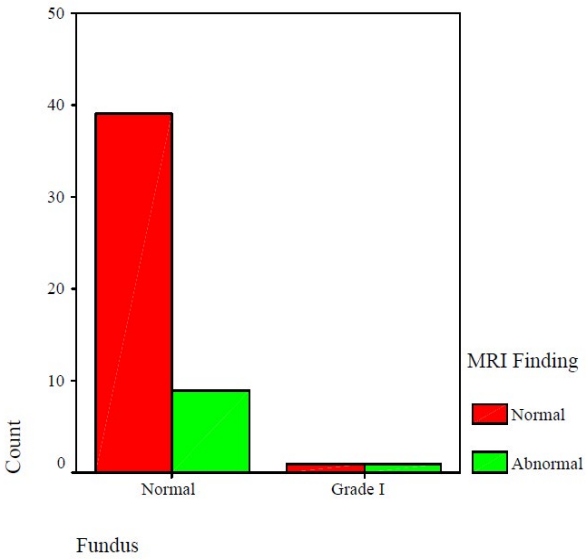


Figure 13 : Correlation between Fundus examination findings and MRI findings among study participants

Table-26: Fundus

	Frequency (n) (N=50)	Percent (%)
Normal	48	96.0
Grade I	2	4.0
Total	50	100.0

Table-27: Fundus * Mri Finding

Fundus		MRI Finding		P value
		Normal	Abnormal	
Normal	Count	39	9	.279
	% within Fundus	81.3%	18.8%	
	% within MRI	97.5%	90.0%	
Grade I	Count	1	1	
	% within Fundus	50.0%	50.0%	
	% within MRI	2.5%	10.0%	

Table-28: Hemoglobin

	Frequency (n) (N=50)	*Percent (%)*
7-9	6	12.0
9-11	36	72.0
> 11	8	16.0
Total	50	100.0

Fundus

Out of 50 patients,48 patients have normal fundus. Only two Patients have hypertensive retinopathy of Grade I.

In our study group, 90% of the patients with abnormal MRI finding have normal fundus.

Hemoglobin

36 patients have Hb% in the range of 9-11g%.6 patients have hemoglobin ranging between 7-9 g%.

In my study group,60% of the patients having abnormal MRI finding have hemoglobin in the range of 9-11g%. The patients with Hb in the range of 7-9 g% have only 10% of abnormal finding. p value is 0.402 which is not statistically significant.

Platelet Count In Lakhs

Patients with abnormal MRI finding have platelet count

Table-29: Hemoglobin * Mri Finding

Hemoglobin		*MRI Finding*		*P value*
		Normal	*Abnormal*	
7-9	Count	5	1	
	% within Hemoglobin	83.3%	16.7%	
	% within MRI Finding	12.5%	10.0%	
9-11	Count	30	6	
	% within Hemoglobin	83.3%	16.7%	
	% within MRI Finding	75.0%	60.0%	.402
> 11	Count	5	3	
	% within Hemoglobin	62.5%	37.5%	
	% within MRI Finding	12.5%	30.0%	

of <3 lakh's value is 0.447, statistically not significant.

Lft

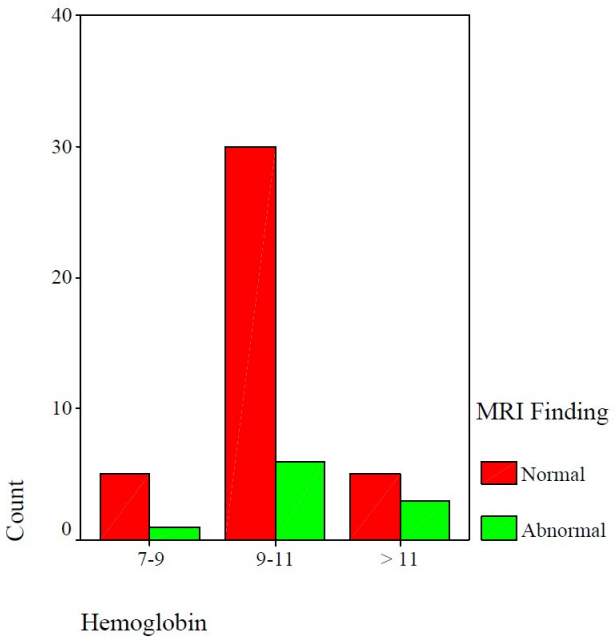


Figure 14: Correlation between Hemoglobin and MRI findings among study participants

Table-30: Platelet Count

	Frequency (n) (N=50)	*Percent (%)*
1-2 L	19	38.0
2-3 L	26	52.0
3-4 L	5	10.0
Total	50	100.0

Table-31: Platelet Count In Lakhs * Mri Finding

Platelet count in lakhs		*MRI Finding*		*P value*
		Normal	*Abnormal*	
1-2	Count	15	4	.447
	% within Platelet count in lakhs	78.9%	21.1%	
	% within MRI Finding	37.5%	40.0%	
2-3	Count	22	4	
	% within Platelet count in lakhs	84.6%	15.4%	
	% within MRI Finding	55.0%	40.0%	
3-4	Count	3	2	
	% within Platelet count in lakhs	60.0%	40.0%	
	% within MRI Finding	7.5%	20.0%	

Table-32: LFT

	Frequency (n) (N=50)	*Percent (%)*
Normal	49	98.0
Altered	1	2.0
Total	50	100.0

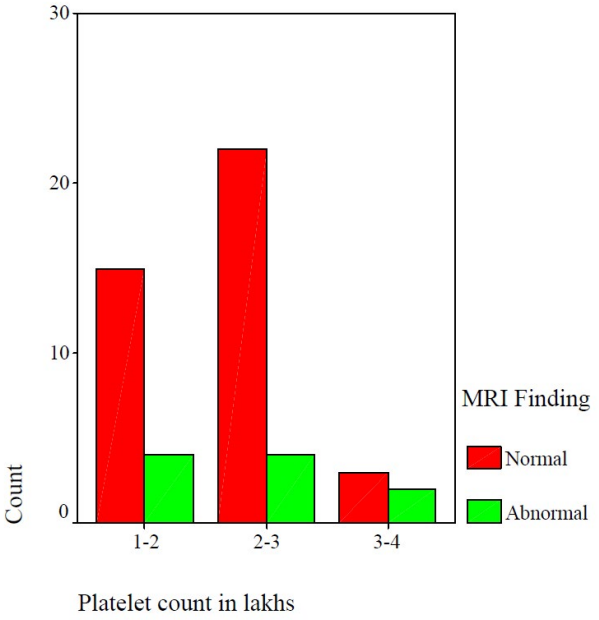


Figure 15: Correlation between Total platelet count and MRI findings among study participants

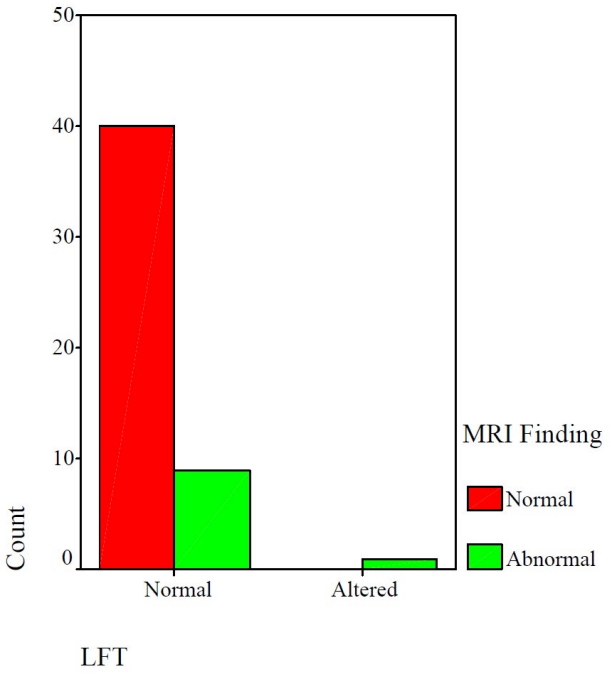


Figure 16: Correlation between Liver function test and MRI findings among study participants

Out of 50 patients in my study group, only one patient has altered liver function test.

Table-33: Lft * Mri Finding

LFT		MRI Finding		P value
		Normal	Abnor mal	
Normal	Count	40	9	.043**
	% within LFT	81.6%	18.4%	
	% within MRI Finding	10.0%	90.0%	
Altered	Count	0	1	
	% within LFT	.0%	100.0%	
	% within MRI Finding	.0%	100.0%	

Table-34: Rft

	Frequency (n) (N=50)	*Percent (%)*
Normal	48	96.0
Altered	2	4.0
Total	50	100.0

In our study group, the patient with altered liver function test has 100% abnormal MRI finding. Others with normal LFT have 90% have abnormal MRI finding. p value is 0.043**, significant.

Renal Function Test

In our study group, out of 50 patients, only 2 patients have altered renal function test.

Among the patients with altered renal function test,50% have normal and 50% have abnormal MRI finding. p value is 0.279, which is statistically not significant.

Magnesium Sulphate

All Eclamptic patients in our study group were treated with standard dose of Magnesium Sulphate regimen.

Table-35: Rft * Mri Finding

RFT		*MRI Finding*		
		Normal	*Abnormal*	*P value*
Normal	Count	39	9	.279
	% within RFT	81.3%	18.8%	
	% within MRI Finding	97.5%	90.0%	
Altered	Count	1	1	
	% within RFT	50.0%	50.0%	
	% within MRI Finding	2.5%	10.0%	

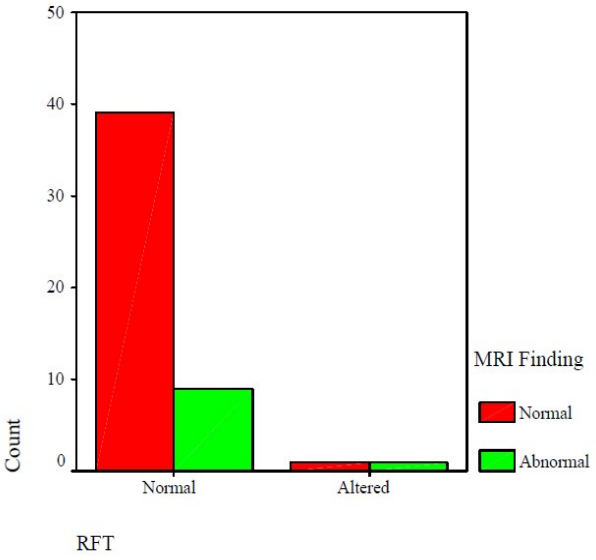


Figure 17: Correlation between Renal function test and MRI findings among study participants

Table-36: Magnesium Sulphate

	Frequency (n) (N=50)	*Percent (%)*
Standard	50	100.0

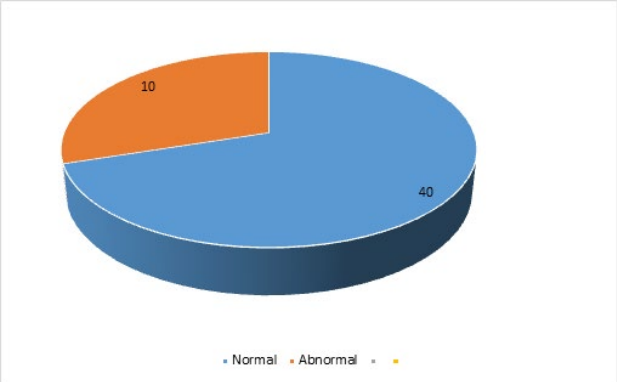


Figure18 : MRI findings among study participants

Table-37: Mri Finding

MRI Findings	*Frequency (n) (N=50)*	*Percent (%)*
Normal	40	80.0
Abnormal	10	20.0

Table-38: Mri Finding

MRI FINDING	*Frequency (n) (N=50)*	*Percent (%)*
Normal	40	70.0
PRES	5	20.0
Diffuse Cerebral Edema	2	4.0
Right Temporal Infarct	1	2.0
Acute Infarct & PRES	1	2.0
Diffuse Cerebral Edema & PRES	1	2.0

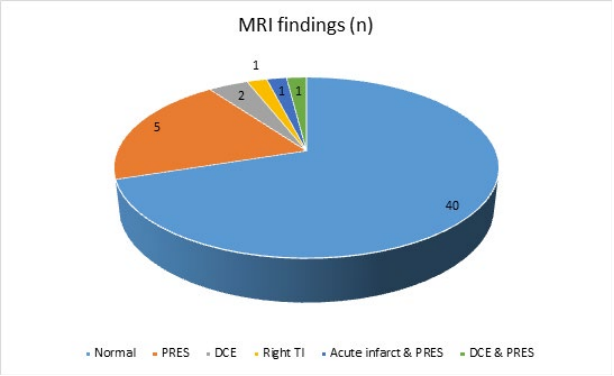


Figure 19: Distribution of MRI findings among study participants

Table-39 Maternal Recovery

RECOVERY	*Frequency (n) N=50*	*Percent (%)*
Recovery without sequelae	46	92.0
Recovery with sequelae	3	6.0
Expired	1	2.0
Total	50	100.0

Table-40: Maternal Recovery

		MRI Finding		*P value*
		Normal	*Abnormal*	
Recovery without sequelae	Count	40	6	Significant p<0.000
	% within recovery	86.96%	13.04%	
	% within MRI Finding	100%	60.0%	
Recovery with sequelae	Count	0	3	
	% within recovery	0%	100%	
	% within MRI Finding	0%	30.0%	
Died	Count	0	1	
	% within recovery	0%	100%	
	% within MRI Finding	0%	10.0%	

Mri Finding

In our study group,80% have normal MRI finding,20% have abnormal MRI finding.

Mri Finding

Out of 50 Eclampsia patients in our study group,40 patients have normal MRI finding. Out of 50, 5 patients are diagnosed as having Posterior Reversible Encephalopathy syndrome. Two patients have diffuse cerebral edema, one patient has Right temporal infarct, one patient has combination of both Acute infarct and PRES. One patient has both diffuse cerebral edema and PRES.

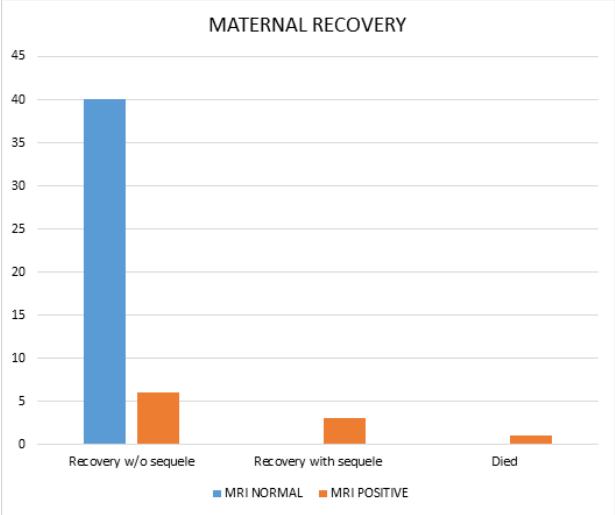


Figure 20: Correlation between Maternal Recovery and MRI findings among study participants

MRI FINDING

In our study group 46 patients (92%) recovered completely, 3 patients (6%) recovered with sequel and only 1 patient had died.

About 86.96% of patients in negative group recovered without sequel. All patient with abnormal MRI finding had either recovered with sequel or died. p value is 0.000, which is statistically significant.

DISCUSSION

The present prospective cross-sectional study evaluated the clinical correlation of MRI findings in patients with severe preeclampsia and eclampsia. Neurological involvement is one of the most serious complications of hypertensive disorders of pregnancy and contributes substantially to maternal morbidity and mortality. MRI serves as a valuable modality for identifying cerebral abnormalities and guiding management. The findings of the present study demonstrate a significant relationship between clinical severity and neuroimaging abnormalities(7).

The majority of patients belonged to the 21–25-year age group, which is consistent with previous studies reporting a higher incidence of hypertensive disorders among younger pregnant women. Most patients were primigravidae, supporting the widely accepted observation that first pregnancies are associated with a greater risk

of preeclampsia and eclampsia due to immunological maladaptation and abnormal trophoblastic invasion(8).

Most participants presented during the antepartum period, particularly between 29 and 36 weeks of gestation, emphasizing the role of placental pathology in disease development. However, postpartum patients demonstrated a relatively higher frequency of abnormal MRI findings, suggesting that neurological complications may persist or even manifest after delivery(6). Neurological symptoms were common among study participants, with headache being the predominant symptom, followed by visual disturbances, vomiting, and seizures. These symptoms are believed to result from cerebral edema, raised intracranial pressure, and impaired cerebral autoregulation. The high prevalence of imminent symptoms highlights the importance of early neurological assessment in patients with severe hypertensive disorders of pregnancy(9).

A significant association was observed between low Glasgow Coma Scale (GCS) scores and abnormal MRI findings. Patients with GCS ≤9 had a substantially higher incidence of cerebral lesions, indicating that deterioration in consciousness may reflect significant cerebral involvement. Similarly, elevated systolic blood pressure showed a strong correlation with MRI abnormalities. Most patients with positive MRI findings had systolic blood pressure between 161 and 200 mmHg. These findings support the hypothesis that severe hypertension disrupts cerebral autoregulation, leading to endothelial dysfunction, vasogenic edema, and cerebral injury(10).

Among laboratory parameters, altered liver function tests demonstrated a significant association with abnormal MRI findings, suggesting that systemic endothelial injury and multiorgan dysfunction may parallel cerebral involvement. Although renal dysfunction and thrombocytopenia were observed in some patients, these parameters did not show statistically significant associations with MRI abnormalities in the present study. MRI abnormalities were identified in 20% of patients. Posterior Reversible Encephalopathy Syndrome (PRES) was the most common neuroimaging finding, followed by diffuse cerebral edema and cerebral infarction(3). The parieto-occipital region was the most frequently affected area. These findings are consistent with previous reports demonstrating that PRES represents the characteristic radiological manifestation of severe preeclampsia and eclampsia. The preferential involvement of posterior cerebral circulation is attributed to reduced sympathetic innervation and increased susceptibility to autoregulatory failure. The overall maternal outcome was favorable, with most patients recovering completely following standard management, including magnesium sulfate therapy and blood pressure control. Only a small proportion experienced neurological sequelae, and mortality was rare. Importantly, neurological symptoms such as headache, visual disturbances, seizures, and altered consciousness resolved within one week after delivery in most patients, highlighting the reversible nature of cerebral changes when diagnosed and treated promptly(11).

The findings of this study emphasize the clinical utility of MRI in identifying cerebral complications in severe preeclampsia and eclampsia. Patients presenting with severe hypertension, low GCS scores, neurological symptoms, or evidence of systemic organ dysfunction may benefit from early neuroimaging evaluation. Timely diagnosis of conditions such as PRES allows prompt intervention and may prevent permanent neurological damage, thereby improving maternal outcomes.

CONCLUSION

This study demonstrates that cerebral involvement is an important complication of severe preeclampsia and eclampsia and can be effectively evaluated using MRI. Neuroimaging abnormalities were detected in 20% of patients, with Posterior Reversible Encephalopathy Syndrome (PRES) being the most common finding, followed by diffuse cerebral edema and cerebral infarction. The parieto-occipital region was the most frequently affected area. Significant associations were observed between abnormal MRI findings and low Glasgow Coma Scale scores, elevated systolic blood pressure, and abnormal liver function tests. Neurological manifestations such as headache, visual disturbances, seizures, and altered consciousness were common among patients with cerebral lesions. Most patients showed complete clinical recovery following appropriate management, emphasizing the reversible nature of these abnormalities when diagnosed early. MRI should be considered an important diagnostic tool in patients with severe preeclampsia and eclampsia, particularly in those presenting with neurological symptoms or severe hypertension. Early recognition of cerebral involvement can facilitate timely intervention, reduce maternal morbidity, and improve overall pregnancy outcomes.

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