



MATERNAL AND NEONATAL OUTCOMES IN ECLAMPSIA WITH NEUROLOGICAL COMPLICATIONS AT A TERTIARY CARE CENTER

Dr. Deepika Agrawal^{1*}, Dr. Kumar Nitish²

^{1*} Associate Professor, Department of Gynaecology & Obstetrics, Varun Arjun Medical College & Rohilkhand Hospital, Shahjahanpur, Uttar Pradesh

² Consultant Neurosurgeon, Nivansh Healthcare Centre, Shahjahanpur, Uttar Pradesh

*Corresponding Author: Dr Deepika Agrawal

*Email Id: Deepika2436@gmail.com

Abstract

BACKGROUND: Eclampsia with neurological symptoms is a serious obstetric complication contributing significantly to maternal and fetal morbidity and mortality. In resource-limited settings, clinical evaluation of such cases remains a significant challenge due to limited access to advanced diagnostics.

OBJECTIVES: To evaluate maternal and fetal outcomes in patients with eclampsia presenting with neurological symptoms and identify the most common manifestations associated with adverse outcomes.

METHODS: A prospective cross-sectional study was conducted over three months in the Department of Obstetrics and Gynaecology at a tertiary care hospital. A total of 40 pregnant women with eclampsia and neurological symptoms were included. Clinical data, including demographic details, neurological signs, blood pressure, proteinuria, maternal outcomes (ICU admission, ventilation, mortality), and fetal outcomes (birth weight, APGAR scores, NICU admission, stillbirths) were collected using structured proformas and analysed using descriptive statistics and chi-square tests.

RESULTS: The most frequent age group was 21–25 years ($n = 18$; 45.00%), and 62.50% ($n = 25$) were primigravida. Seizures were present in all patients (100%), followed by headache in 32 (80.00%) and visual disturbances in 18 (45.00%). Systolic blood pressure ≥ 160 mmHg was observed in 24 patients (60.00%), and 15 (37.50%) had 3+ proteinuria. ICU admissions were required in 12 cases (30.00%), ventilatory support in 5 (12.50%), and maternal mortality occurred in 2 patients (5.00%). Fetal complications included low birth weight in 22 neonates (55.00%), APGAR score < 7 at 5 minutes in 10 (25.00%), NICU admissions in 12 (30.00%), and 3 stillbirths (7.50%).

CONCLUSIONS: Neurological symptoms in eclampsia significantly influence maternal and neonatal outcomes. Early detection and multidisciplinary care are critical in improving prognosis in such high-risk pregnancies.

Keywords: Pregnancy complications, Neurologic manifestations, Maternal mortality, Infant mortality, Intensive care units

Introduction

Eclampsia is a life-threatening obstetric emergency characterized by the occurrence of seizures in women with pre-eclampsia, often without any prior warning signs. It is a significant contributor to

maternal and fetal morbidity and mortality, especially in low- and middle-income countries like India, where access to quality antenatal care may be limited [1,2]. The global incidence of eclampsia varies from 1 in 100 to 1 in 1700 pregnancies, depending on geographic and socioeconomic conditions [3]. Neurological complications such as seizures, altered mental status, cortical blindness, and even stroke can complicate eclampsia and are key determinants of adverse maternal outcomes [4,5]. These symptoms are primarily attributed to cerebral vasospasm, oedema, and in severe cases, posterior reversible encephalopathy syndrome (PRES), which is increasingly being identified as a neuroimaging correlate in such cases [6-8].

Several recent studies have attempted to explore the relationship between severe hypertension in pregnancy and neurological manifestations [9,10]. However, many of these investigations have focused on retrospective data or lack sufficient focus on maternal and fetal outcomes following neurological symptoms. PRES, though recognized more frequently due to improved neuroimaging, remains underreported in resource-constrained settings due to limited diagnostic access [11,12].

In India, hypertensive disorders of pregnancy (HDP) remain the second leading cause of maternal mortality [13], and eclampsia accounts for nearly 12% of all maternal deaths as per recent national health surveys [14]. Despite existing clinical guidelines, management strategies vary widely, especially in rural and semi-urban healthcare settings [15].

Justification of the Study

Although neurological complications of eclampsia significantly influence maternal and fetal outcomes, there remains a paucity of prospective data specifically examining the spectrum and frequency of these manifestations in tertiary care settings in India. Most existing literature focuses on biochemical markers or radiological profiles; however, few studies assess clinical neurological manifestations as direct predictors of outcomes. Furthermore, in resource-limited environments, the timely identification and categorisation of symptoms can significantly impact the course of treatment and improve prognosis. Therefore, a structured clinical investigation into these outcomes is essential for guiding early interventions, informing risk stratification, and enhancing maternal care.

Purpose of the Study

This study was conceptualised based on observed clinical cases at a tertiary care hospital where several pregnant women with eclampsia presented with acute neurological symptoms requiring intensive care. The purpose of this prospective cross-sectional study is to assess maternal and fetal outcomes in patients with eclampsia presenting with neurological symptoms and to identify the most common neurological manifestations associated with adverse outcomes. The findings are expected to generate clinically relevant insights that can inform practice guidelines, particularly in similar tertiary and peripheral healthcare settings.

Material and Methods

Study Design and Setting

This was a prospective cross-sectional study conducted over three months, from April 2024 to June 2024, in the Department of Gynaecology and Obstetrics, Varun Arjun Medical College & Rohilkhand Hospital, Shahjahanpur (U.P.), a tertiary care teaching hospital.

Study Population

A total of 40 pregnant women diagnosed with eclampsia presenting with neurological symptoms were enrolled during the study period. Informed written consent was obtained from all participants.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Pregnant women diagnosed with eclampsia and neurological symptoms
- Patients admitted for management during the study period
- Patients who gave informed written consent

Exclusion Criteria:

- Women with prior known neurological disorders (e.g., epilepsy, stroke)
- Non-eclamptic hypertensive disorders in pregnancy
- Incomplete clinical or follow-up data

Data Collection Procedure

Patient data were collected prospectively using predesigned structured case report forms at the time of hospital admission. Clinical monitoring logs and departmental patient records were used to supplement data collection. Demographic details (age, parity, gestational age), clinical symptoms (e.g., seizures, headache, visual disturbances), vitals (systolic and diastolic blood pressure), and neurological parameters (GCS score, stroke, cortical blindness) were recorded.

Drugs and Interventions

Antihypertensive medications such as labetalol and magnesium sulphate for seizure prophylaxis were administered as per hospital protocol. Magnesium sulphate was administered intravenously (i.v.) at a loading dose of 4 g over 20 minutes, followed by a maintenance dose of 1 g/h for 24 hours. Drug dosages were adjusted as per patient weight (mg/kg body weight). The source of the drugs included the hospital pharmacy, which provided standard, quality-assured formulations.

Assessment Parameters

- **Maternal outcomes:** Mode of delivery (vaginal/Caesarean), ICU admission, ventilatory support requirement, maternal mortality
- **Fetal outcomes:** Birth weight (g), APGAR scores at 1 and 5 minutes, NICU admission, stillbirths
- **Neurological status:** GCS score, presence of stroke or visual loss

Statistical Methods

Continuous variables were summarised as mean and standard deviation (SD) or median where appropriate. Categorical variables were expressed as frequencies and percentages. Chi-square tests were applied to assess associations between categorical variables. Logistic regression analysis was used to identify predictors of adverse maternal and fetal outcomes. A p-value < 0.05 was considered statistically significant. Data analysis was performed using SPSS software (IBM Corp., Version 26.0).

Ethical Considerations

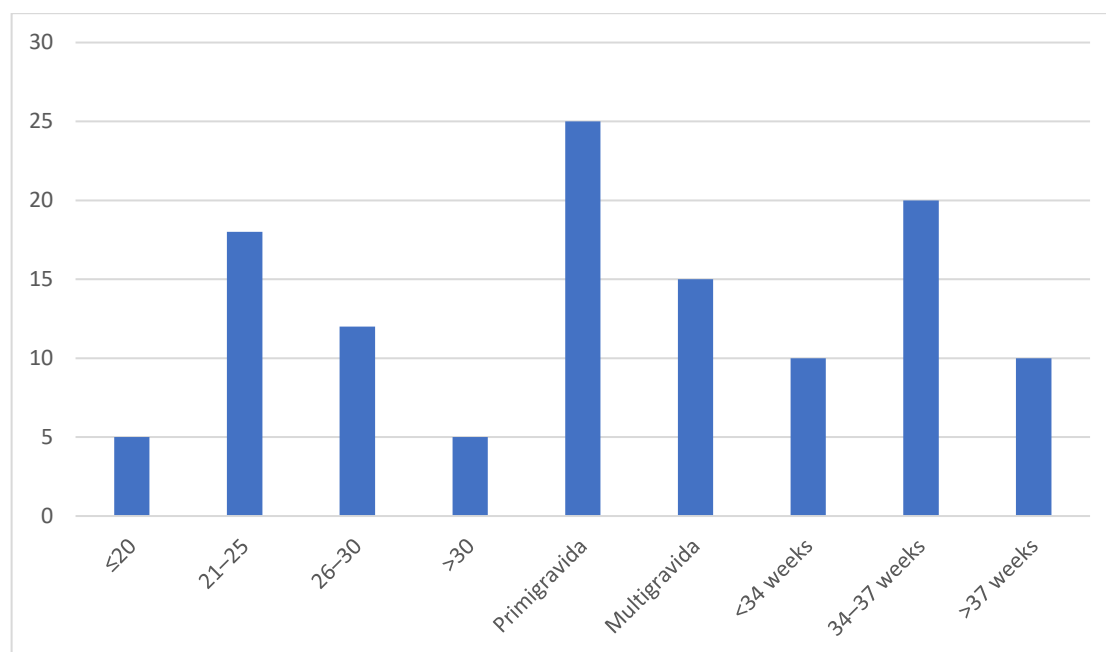
The study was approved by the Institutional Ethics Committee (IEC/VAMC/OG/004/Mar2025) of Varun Arjun Medical College & Rohilkhand Hospital. All participants provided informed written consent prior to their inclusion. Anonymizing records maintained participant confidentiality, and all data were securely stored for a minimum of 3 years post-study.

Results

The study included a total of 40 patients diagnosed with eclampsia and presenting with neurological symptoms. The majority of patients were between 21 and 25 years old (n = 18; 45.00%) (Table 1 & Figure 1). The mean age was 24.80 years (Table 1 & Figure 1). Most patients were primigravida (n = 25; 62.50%) (Table 1 & Figure 1). Gestational age at admission was predominantly between 34 and 37 weeks (n = 20; 50.0%) (Table 1 & Figure 1).

Table 1: Distribution of Age, Gravida, and Gestational Age Among Eclamptic Patients with Neurological Symptoms

Variable	Frequency (%)
Age Group (years)	
≤20	5 (12.50%)
21–25	18 (45.00%)
26–30	12 (30.00%)
>30	5 (12.50%)
Gravida	
Primigravida	25 (62.50%)
Multigravida	15 (37.50%)
Gestational Age	
<34 weeks	10 (25.00%)
34–37 weeks	20 (50.00%)
>37 weeks	10 (25.00%)

**Figure 1: Distribution of Age, Gravida, and Gestational Age Among Eclamptic Patients with Neurological Symptoms**

Seizures were the most common symptom (n=40; 100.00%), followed by headache (n=32; 80.00%) and visual disturbances (n=18; 45.00%) (Table 2 & Figure 2). Altered sensorium was observed in 10 patients (25.00%) (Table 2 & Figure 2).

Table 2: Frequency of Neurological Symptoms at Presentation in Eclamptic Patients

Symptom	Frequency (%)
Seizures	40 (100.00%)
Headache	32 (80.00%)
Visual disturbances	18 (45.00%)
Altered sensorium	10 (25.00%)

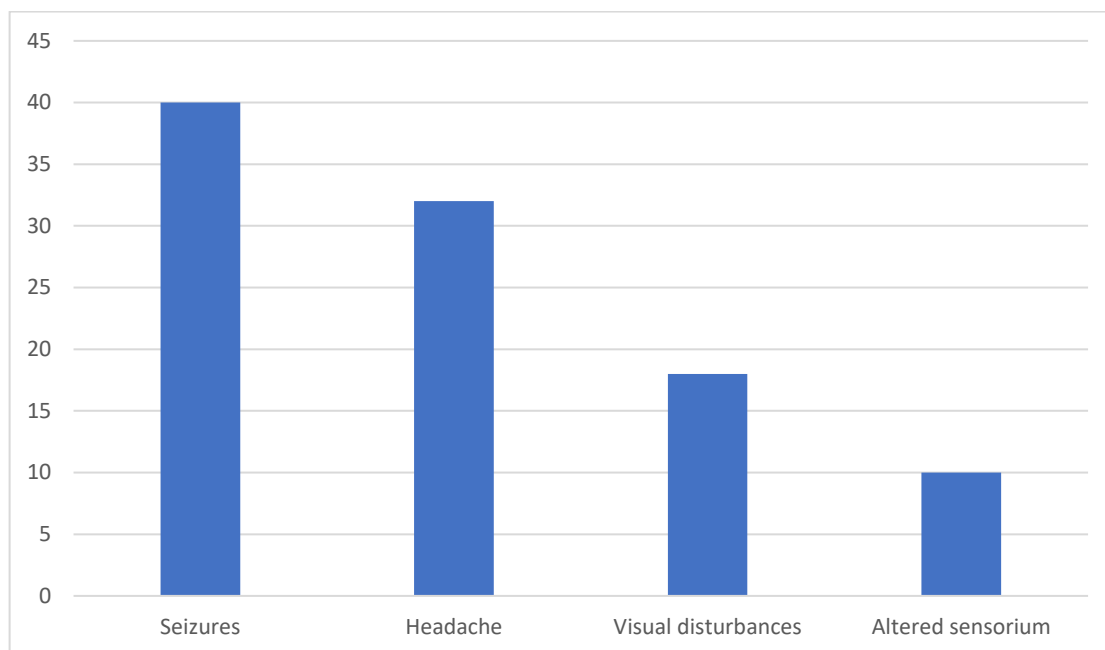


Figure 2: Frequency of Neurological Symptoms at Presentation in Eclamptic Patients

Systolic blood pressure ≥ 160 mmHg was recorded in 24 patients (60.00%) (Table 3 & Figure 3). Proteinuria of 3+ was noted in 15 patients (37.50%) (Table 3 & Figure 3).

Table 3: Systolic Blood Pressure and Proteinuria Levels at Admission in Eclamptic Patients

Parameter	Frequency (%)
Systolic BP (mmHg)	
<160	16 (40.00%)
≥ 160	24 (60.00%)
Proteinuria (Dipstick)	
1+	5 (12.50%)
2+	20 (50.00%)
3+	15 (37.50%)

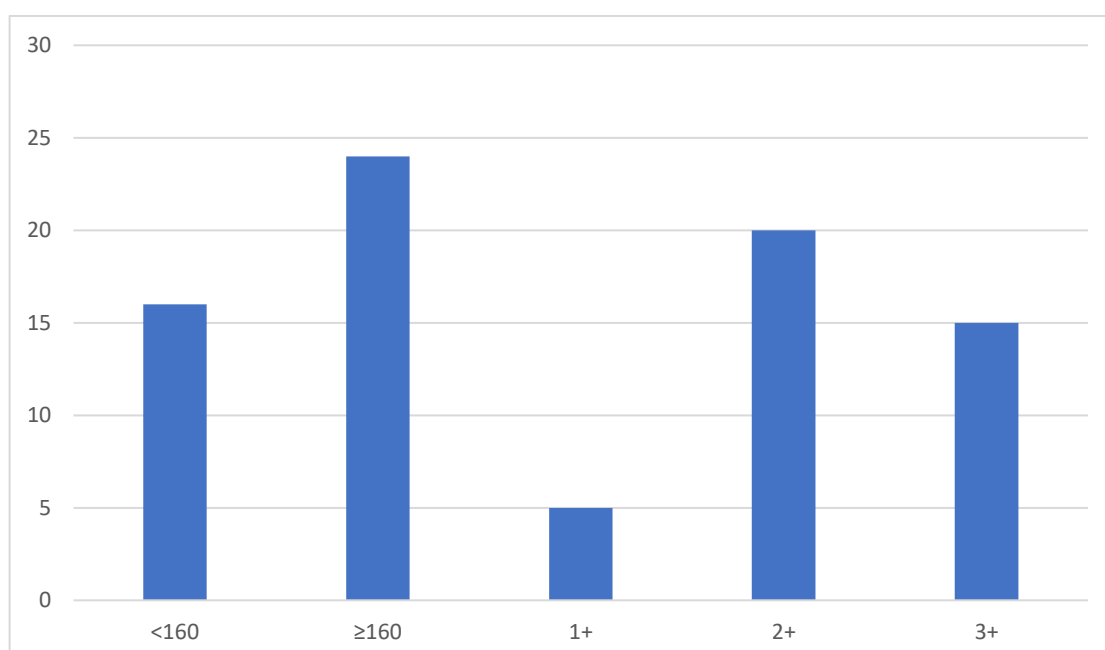


Figure 3: Systolic Blood Pressure and Proteinuria Levels at Admission in Eclamptic Patients

A Glasgow Coma Scale (GCS) score of ≤ 8 was observed in 6 patients (15.00%) (Table 4 & Figure 4). Stroke was identified in 2 patients (5.00%), and cortical blindness in 4 patients (10.00%) (Table 4 & Figure 4).

Table 4: Neurological Complications Observed in Eclamptic Patients with Neurological Symptoms

Complication	Frequency (%)
GCS ≤ 8	6 (15.00%)
Stroke	2 (5.00%)
Cortical blindness	4 (10.00%)

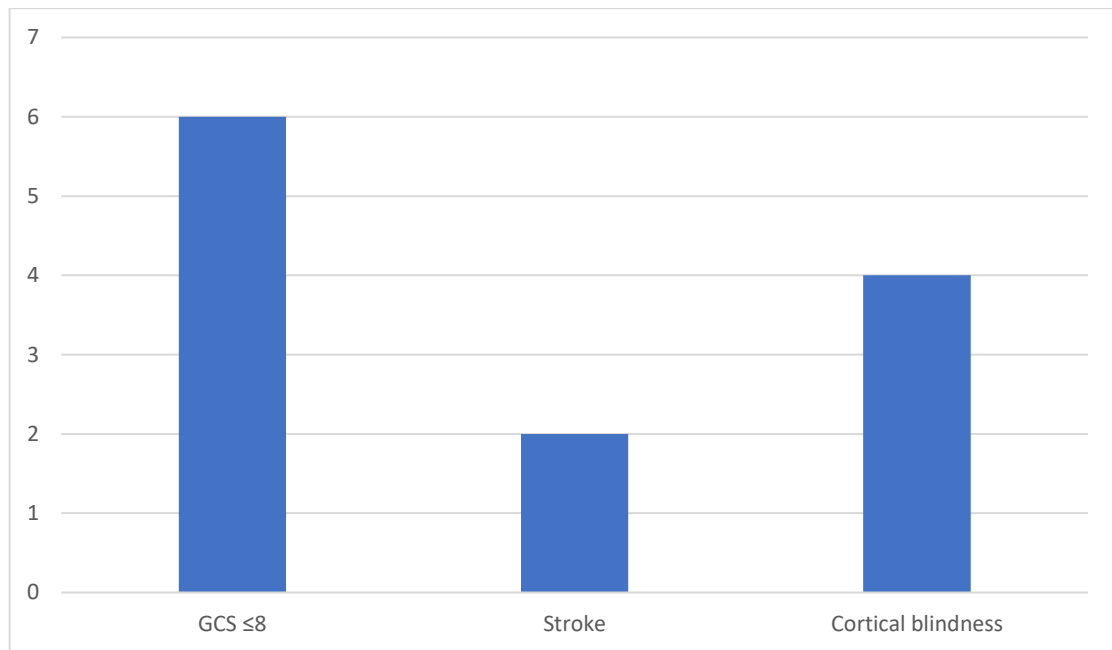


Figure 4: Neurological Complications Observed in Eclamptic Patients with Neurological Symptoms

Cesarean section was performed in 28 patients (70.0%) (Table 5 & Figure 5). ICU admission was required for 12 patients (30.0%), and 5 patients (12.5%) required ventilatory support (Table 5 & Figure 5). Maternal mortality occurred in 2 patients (5.0%) (Table 5 & Figure 5).

Table 5: Maternal Outcomes Including Delivery Mode, ICU Admission, and Mortality Among Eclamptic Patients

Outcome	Frequency (%)
Vaginal	12 (30.00%)
Cesarean	28 (70.00%)
ICU Admission	12 (30.00%)
Ventilatory Support	5 (12.50%)
Maternal Mortality	2 (5.00%)

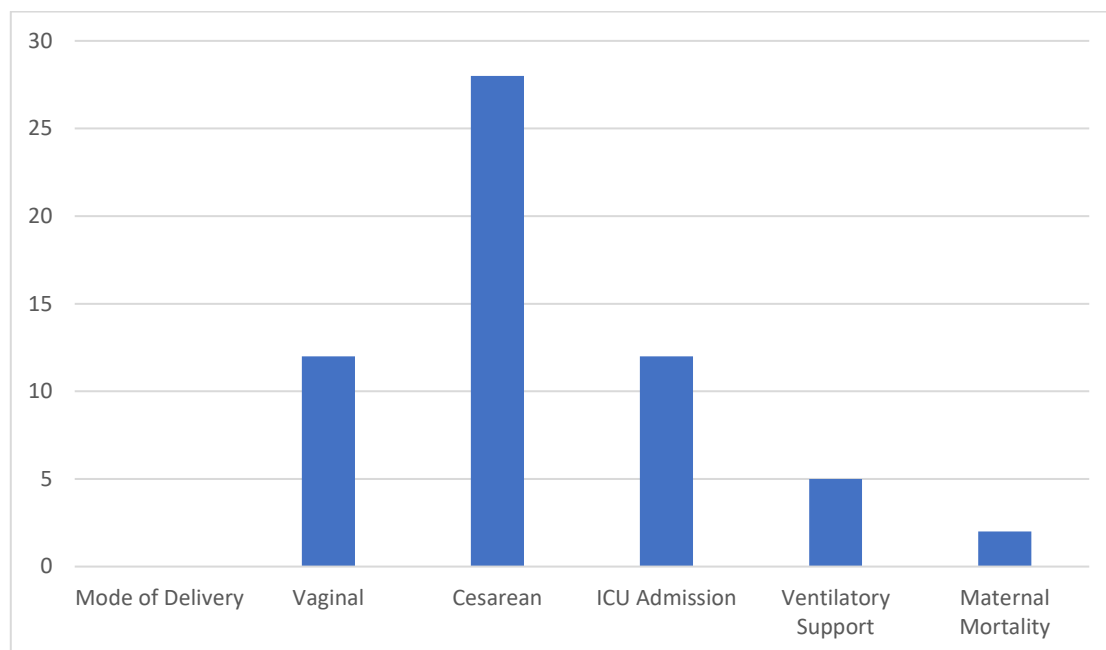


Figure 5: Maternal Outcomes Including Delivery Mode, ICU Admission, and Mortality Among Eclamptic Patients

Birth weight <2.5 kg was noted in 22 neonates (55.00%) (Table 6 & Figure 6). APGAR score <7 at 5 minutes was seen in 10 cases (25.00%) (Table 6 & Figure 6). NICU admission was required in 12 cases (30.00%), and 3 stillbirths (7.50%) were reported (Table 6 & Figure 6).

Table 6: Fetal Outcomes Including Birth Weight, APGAR Scores, NICU Admissions, and Stillbirths

Parameter	Frequency (%)
Birth Weight <2.5 kg	22 (55.00%)
APGAR Score <7 (5 min)	10 (25.00%)
NICU Admission	12 (30.00%)
Stillbirth	3 (7.50%)

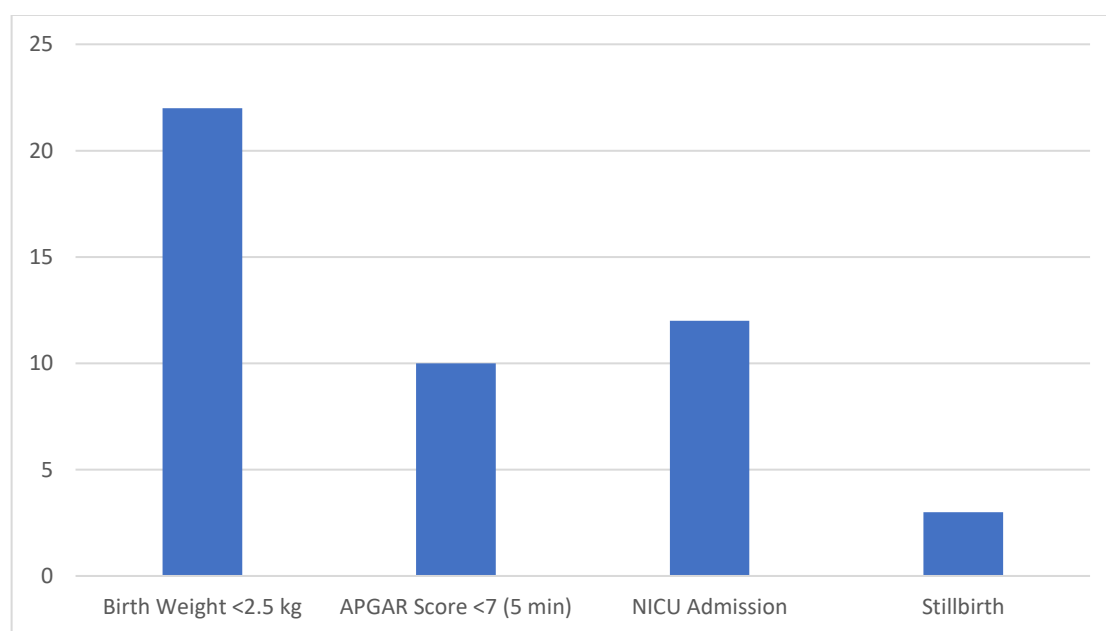


Figure 6: Fetal Outcomes Including Birth Weight, APGAR Scores, NICU Admissions, and Stillbirths

Discussion

This prospective cross-sectional study evaluated maternal and fetal outcomes in women with eclampsia presenting with neurological symptoms, providing clinically relevant insights into a high-risk subset of obstetric patients. One notable finding was the high proportion of primigravida patients (62.50%), which aligns with existing literature identifying primigravida as a significant risk factor for eclampsia [16,17].

Seizures were universal among all patients, frequently accompanied by headache (80.00%) and visual disturbances (45.00%). These clinical presentations are consistent with the symptom profile reported in studies by Douglas et al, where headache and visual symptoms were standard prodromal features preceding seizures [18]. Altered sensorium observed in 25.00% of patients in our study is comparable to findings by Adekanle et al., who reported similar neurological deterioration requiring critical care in Nigerian cohorts [19].

A systolic blood pressure ≥ 160 mmHg was observed in 60.00% of patients, which is in agreement with the severe hypertension thresholds proposed in international guidelines [20]. Interestingly, 37.50% of patients had 3+ proteinuria, reaffirming the diagnostic emphasis on both neurological and renal involvement in eclampsia, as noted by Magee et al. [21].

Among neurological complications, 15.00% of patients had a Glasgow Coma Scale (GCS) ≤ 8 , and cortical blindness was identified in 10.00%, which may suggest underlying posterior reversible encephalopathy syndrome (PRES). These findings echo those of Brewer et al., who described PRES-like features in nearly all their eclamptic cases [22]. Stroke, although less frequent (5.00%), still represents a serious complication that corroborates earlier reports highlighting cerebrovascular accidents as a rare but devastating sequelae [23].

Maternal outcomes in this cohort were concerning, with 30% requiring ICU admission and 12.5% needing ventilatory support. The 5.00% maternal mortality rate, though lower than reported in some low-resource settings [24], still underscores the severity of neurological complications in eclampsia. Cesarean delivery rate was high (70.00%), reflecting clinical decisions to expedite delivery due to maternal instability, as similarly documented by Dalal M et al. [25].

Fetal outcomes, too, were suboptimal. Low birth weight was noted in over half (55.00%) of the neonates, and NICU admissions were required in 30.00%, paralleling the perinatal outcomes reported by Uzan et al. in cases of severe preeclampsia and eclampsia [26]. The stillbirth rate of 7.50% is modestly lower than rates reported in earlier Indian data but remains clinically significant [27].

Study Limitations

This study has several limitations. First, the relatively small sample size ($n = 40$) limits the statistical power and generalizability of the findings. Second, the absence of neuroimaging facilities restricted confirmation of PRES or other structural abnormalities. Additionally, the study's single-centre design may not accurately reflect outcomes in different geographic or healthcare settings. There was also reliance on clinical symptomatology rather than electrophysiological or imaging-based diagnostics for neurological complications, which may introduce classification bias.

Implications and Recommendations

The study emphasises the significance of early neurological evaluation and multidisciplinary management in the context of eclampsia. Incorporating structured neurological assessments, expanding neuroimaging capabilities, and strengthening ICU preparedness may help reduce both maternal and neonatal morbidity and mortality. Future multicenter studies with larger sample sizes and neuroimaging-based validation are warranted to better delineate the spectrum of neurological complications in eclampsia.

Conclusions

In conclusion, eclamptic women with neurological symptoms represent a particularly vulnerable group with elevated risks of ICU admission, poor fetal outcomes, and mortality. The findings reinforce the study objectives of highlighting the clinical burden of neurological involvement in eclampsia and

call for strengthened protocols to ensure timely recognition and management. Despite resource constraints, systematic documentation and targeted interventions can significantly influence clinical outcomes in such high-risk pregnancies.

Conflicts of Interest:

The authors declare no conflicts of interest.

Sources of Funding:

No external funding was received for this study.

Abbreviations

- **APGAR** – Appearance, Pulse, Grimace, Activity, Respiration
- **BP** – Blood Pressure
- **GCS** – Glasgow Coma Scale
- **HDP** – Hypertensive Disorders of Pregnancy
- **ICU** – Intensive Care Unit
- **MeSH** – Medical Subject Headings
- **NICU** – Neonatal Intensive Care Unit
- **PRES** – Posterior Reversible Encephalopathy Syndrome
- **SD** – Standard Deviation
- **SEM** – Standard Error of Mean
- **SPSS** – Statistical Package for the Social Sciences

References

1. Duley L. The global impact of pre-eclampsia and eclampsia. *Semin Perinatol*. 2009;33(3):130-137.
2. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. *Lancet Glob Health*. 2014;2(6):e323-e333.
3. Sibai BM. Diagnosis and management of gestational hypertension and preeclampsia. *Obstet Gynecol*. 2003;102(1):181-192.
4. Miller EC. Maternal Stroke Associated With Pregnancy. *Continuum (Minneapolis)*. 2022 Feb 1;28(1):93-121. doi: 10.1212/CON.0000000000001078.
5. Martin JN Jr, Thigpen BD, Moore RC, Rose CH, Cushman J, May WL. Stroke and severe preeclampsia and eclampsia: A paradigm shift focusing on systolic blood pressure. *Obstet Gynecol*. 2005;105(2):246-254.
6. Hinchey J, Chaves C, Appignani B, Breen J, Pao L, Wang A, et al. A reversible posterior leukoencephalopathy syndrome. *N Engl J Med*. 1996;334(8):494-500.
7. Fugate JE, Rabinstein AA. Posterior reversible encephalopathy syndrome: clinical and radiological manifestations, pathophysiology, and outstanding questions. *Lancet Neurol*. 2015;14(9):914-925.
8. Bartynski WS. Posterior reversible encephalopathy syndrome, part 1: fundamental imaging and clinical features. *AJNR Am J Neuroradiol*. 2008;29(6):1036-1042.
9. Abalos E, Cuesta C, Carroli G, Qureshi Z, Widmer M, Vogel JP, et al. Pre-eclampsia, eclampsia and adverse maternal and perinatal outcomes: A secondary analysis of the WHO Multicountry Survey on Maternal and Newborn Health. *BJOG*. 2014;121 Suppl 1:14-24.
10. Marik PE, Rivera R. Hypertensive emergencies: an update. *Curr Opin Crit Care*. 2011 Dec;17(6):569-80
11. Brewer J, Owens MY, Wallace K, Reeves AA, Morris R, Khan M, et al. Posterior reversible encephalopathy syndrome in 46 of 47 patients with eclampsia. *Am J Obstet Gynecol*. 2013;208(6):468.e1-6.

12. Casey SO, Sampaio RC, Michel E, Truwit CL. Posterior reversible encephalopathy syndrome: utility of fluid-attenuated inversion recovery MR imaging in the detection of cortical and subcortical lesions. *AJNR Am J Neuroradiol*. 2000 Aug;21(7):1199-206.
13. Maternal Health Division, Ministry of Health and Family Welfare, Government of India. Annual Report 2022–23. Available at: <https://nhm.gov.in>
14. National Family Health Survey (NFHS-5), India Fact Sheet 2019-21. International Institute for Population Sciences (IIPS).
15. Bajpai D, Popa C, Verma P, Dumanski S, Shah S. Evaluation and Management of Hypertensive Disorders of Pregnancy. *Kidney360*. 2023 Oct 1;4(10):1512-1525.
16. Adekanle DA, Adeyemi AS, Afolabi AF. Predictors of maternal mortality in eclampsia in a developing country. *Sahel Med J*. 2015;18(1):18–22.
17. Sibai BM. Diagnosis, prevention, and management of eclampsia. *Obstet Gynecol*. 2005;105(2):402–410.
18. Douglas KA, Redman CW. Eclampsia in the United Kingdom. *BMJ*. 1994;309(6966):1395–1400.
19. Adeoye IA, Akande TM, Ibrahim M, Adetunji A. Neurological complications of eclampsia in a Nigerian tertiary hospital: a review of 54 cases. *Niger Med J*. 2014;55(5):399–403.
20. American College of Obstetricians and Gynecologists. ACOG Practice Bulletin No. 222: Gestational hypertension and preeclampsia. *Obstet Gynecol*. 2020;135(6):e237–e260.
21. Magee LA, Sharma S, Nathan HL, et al. The incidence of pregnancy hypertension in India, Pakistan, Mozambique, and Nigeria: a prospective population-level analysis. *PLoS Med*. 2019;16(4):e1002783.
22. Brewer J, Owens MY, Wallace K, et al. Posterior reversible encephalopathy syndrome in 46 of 47 patients with eclampsia. *Am J Obstet Gynecol*. 2013;208(6):468.e1–6.
23. Walsh J, Murphy C, Murray A, O'Laoide R, McAuliffe FM. Maternal cerebrovascular accidents in pregnancy: incidence and outcomes. *Obstet Med*. 2010 Dec;3(4):152-5.
24. Ayogu ME, Omonua KI, Omonua KI, Ayogu MC, Ayogu MC. Eclampsia at the university of Abuja teaching hospital: a ten-year review. *Int J Res Med Sci [Internet]*. 2019 Sep. 25 [cited 2025 Jul. 22];7(10):3767-72.
25. Dalal M, Singh S, Chauhan M, Nanda S, Dalal J, Madan S. Maternal and perinatal outcome in eclampsia at a tertiary care center. *Int J Reprod Contracept Obstet Gynecol [Internet]*. 2019 Sep. 26 [cited 2025 Jul. 22];8(10):3898-902.
26. Uzan J, Carbonnel M, Piconne O, et al. Pre-eclampsia: pathophysiology, diagnosis, and management. *Vasc Health Risk Manag*. 2011;7:467–474.
27. Swain S, Ojha KN, Prakash A, Bhatia BD. Maternal and perinatal mortality due to eclampsia. *Indian Pediatr*. 1993 Jun;30(6):771-3.