

Maternal Outcomes According to Mode of Delivery among Women with Eclampsia

Dr. Sharmin Akhter Shorna^{1*}, Dr. Rahima Sultana², Dr. Nazma Khatun³, Dr. Mst. Umme Hani⁴, Dr. Md. Rashedul Hasan⁵, Dr. Shahnaz Sigma⁶, Dr. Mousumi Khan⁷

¹Junior Consultant, Department of Gynecology and Obstetrics, Kurmitola Multicare Specialized Hospital, Dhaka, Bangladesh

²Assistant Surgeon, Department of Female Pelvic Medicine & Reconstruction Surgery Course, Dhaka Medical College Hospital, Dhaka, Bangladesh

³Assistant Professor, Department of Obstetrics and Gynaecology, Kurmitola Multicare Specialised Hospital, Dhaka, Bangladesh

⁴Assistant Professor, Department of Gynecology and Obstetrics, Kurmitola Multicare Specialized Hospital, Dhaka, Bangladesh

⁵Assistant Surgeon, Cardiology, Kamrangirchar 31 bed Hospital, Dhaka, Bangladesh

⁶Assistant Professor, Department of Gynecology and Obstetrics, Kurmitola Multicare Specialized Hospital, Dhaka, Bangladesh

⁷Medical Officer, Department of Gynecology and Obstetrics, Kurmitola Multicare Specialized Hospital, Dhaka, Bangladesh

DOI: <https://doi.org/10.36348/sijog.2026.v09i09.013>

| Received: 02.08.2026 | Accepted: 26.09.2026 | Published: 30.09.2026

*Corresponding author: Dr. Sharmin Akhter Shorna

Assistant Professor, Department of Obstetrics and Gynaecology, International Medical College Hospital, Tongi, Gazipur, Bangladesh

Abstract

Background: Eclampsia is associated with substantial maternal morbidity and mortality, while the optimal mode of delivery remains uncertain because available evidence is conflicting. Therefore, the present study was undertaken to compare maternal outcomes according to mode of delivery among women with eclampsia. **Methods:** This cross-sectional observational study was conducted at the Eclampsia Ward, Department of Gynecology and Obstetrics, Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh, from April 20 to October 20, 2015. A total of 100 women with antepartum eclampsia were enrolled through purposive sampling. Data were collected using a semi-structured questionnaire and analyzed using SPSS to compare maternal outcomes according to mode of delivery. Ethical approval, institutional permission, and informed consent were obtained. **Results:** Among 100 women with eclampsia, 55 (55.0%) had vaginal and 45 (45.0%) caesarean delivery. Demographic and clinical characteristics were largely comparable ($p>0.05$), except urinary albumin distribution ($p=0.034$). Maternal morbidity (45.5% vs. 37.8%) and mortality (5.5% vs. 2.2%) were higher after vaginal delivery. ICU referral was significantly higher following vaginal delivery (29.1% vs. 8.9%; $p=0.012$), while major organ and postpartum complications did not differ significantly ($p>0.05$). Of four maternal deaths, three followed vaginal delivery and one followed caesarean section. **Conclusion:** Vaginal delivery was associated with greater maternal morbidity and ICU requirement among women with eclampsia, highlighting the importance of individualized delivery planning based on maternal and fetal condition.

Keywords: Eclampsia, Maternal Outcomes, Mode of Delivery, Caesarean Section, Vaginal Delivery.

Copyright © 2026 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Eclampsia represents a major contributor to maternal and perinatal mortality and morbidity. It is defined by the development of one or more seizures and/or unexplained coma occurring before, during, or after childbirth, regardless of whether the woman has a preceding history of hypertensive disorders, including preeclampsia [1, 2]. Hypertensive disorders have been identified globally as the second most common direct obstetric cause of maternal death, accounting for

approximately 11%–14% of maternal deaths worldwide, with the greatest burden occurring in developing countries [3]. Eclampsia is currently regarded as a complication of severe preeclampsia, as approximately 84% of affected pregnant women have associated hypertensive disorders, whereas about 16% may present with normal blood pressure [4]. The burden is particularly important in low- and middle-income countries (LMICs), where eclampsia and other hypertensive disorder-related complications during pregnancy, including stroke and coagulopathies,

Citation: Shorna, S. A., Sultana, R., Khatun, N., Hani, U., Hasan, M. R., Sigma, S., & Khan, M. (2026). Maternal Outcomes According to Mode of Delivery among Women with Eclampsia. *Sch Int J Obstet Gynec*, 9(9), 299-307. <https://doi.org/10.36348/sijog.2026.v09i09.013>

contribute substantially to severe maternal morbidity; moreover, eclampsia is recognized as one of the leading causes of intensive care unit (ICU) admission [5].

Severe preeclampsia and eclampsia are associated with a range of serious maternal complications, including HELLP syndrome, hepatic subcapsular hematoma, acute kidney injury, liver rupture, placental abruption, and postpartum hemorrhage, which may ultimately result in maternal death [6, 7]. Although an eclamptic seizure generally does not result in permanent brain damage, intracranial haemorrhage can occur as a potentially serious complication.

Eclampsia has been extensively investigated, and available evidence supports prompt delivery as an important measure for reducing maternal and perinatal mortality and morbidity [8, 9]. Termination of pregnancy is considered essential in the management of eclampsia because removal of the pregnancy addresses the underlying cause of the condition. Therefore, an important clinical consideration is whether caesarean section delivery provides any particular advantage over vaginal delivery in reducing maternal and perinatal deaths [10]. The optimal management of eclampsia involves both MgSO₄ administration and termination of pregnancy, with the latter representing the definitive component of management. Once termination of pregnancy is indicated, the route of birth must be determined, with planned cesarean section and planned vaginal delivery being the principal options. Some authorities, including the World Health Organization, have recommended that women with eclampsia should be delivered within 12 h of admission [11].

However, the effectiveness of the route of termination of pregnancy in reducing morbidity and mortality among women with eclampsia remains uncertain, as available evidence has produced mixed findings [12, 13]. Studies conducted outside India and within India have compared fetomaternal outcomes between different modes of delivery among women with eclampsia and have reported conflicting results. Most of these investigations were observational cohort studies, providing a lower level of evidence than randomized clinical trials. To date, only two randomized trials have been reported in the literature, and both were limited by inadequate sample sizes [14]. Tukur *et al.* reported a higher frequency of maternal complications and admissions of babies to the special care baby unit among women undergoing cesarean section [15]. Conversely, Seal *et al.*, found that the maternal event rate, comprising mortality and severe morbidity, was comparable between the groups, whereas the neonatal event rate was lower following cesarean section, although this difference did not reach statistical significance [14]. From a theoretical perspective, earlier termination of pregnancy through cesarean section may therefore offer greater benefits than vaginal delivery.

Given the conflicting evidence regarding maternal outcomes associated with different modes of delivery in women with eclampsia, further evaluation is warranted to clarify whether the mode of delivery is associated with differences in maternal morbidity, mortality, and other adverse outcomes. Therefore, the present study was undertaken to compare maternal outcomes according to mode of delivery among women with eclampsia.

Objective: To compare maternal outcomes according to mode of delivery among women with eclampsia.

METHODOLOGY & MATERIALS

This cross-sectional observational study was conducted at the Eclampsia Ward, Department of Gynecology and Obstetrics, Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh, from April 20 to October 20, 2015. A total of 100 pregnant women diagnosed with antepartum eclampsia were included through purposive sampling based on predefined inclusion and exclusion criteria to compare maternal outcomes according to mode of delivery.

Inclusion Criteria

- Pregnant women diagnosed with antepartum eclampsia and admitted to Dhaka Medical College Hospital.
- Women who provided informed consent to participate in the study.

Exclusion Criteria

- Patients with a history of previous caesarean section.
- Patients with a bad obstetric history.

Study Variables

The study variables included age, parity, educational status, socioeconomic status, antenatal care, gestational age, blood pressure, clinical symptoms, anticonvulsant use, number of convulsions before admission, intervals from first convulsion to admission and delivery, urine albumin, mode of delivery, maternal mortality and morbidity, ICU referral, major organ complications, postpartum complications, and causes of maternal mortality.

Data Analysis

The collected data were compiled, tabulated, and analyzed using the Statistical Package for the Social Sciences (SPSS). Appropriate statistical methods were applied, and findings were presented in tables.

Ethical Considerations

Ethical Approval

The study was approved by the Ethical Committee of the Bangladesh College of Physicians and Surgeons (BCPS).

Institutional Permission

Written permission was obtained from the concerned authority of Dhaka Medical College Hospital, Dhaka, before approaching eligible patients or their attendants.

Informed Consent: Written informed consent was obtained from each participant before completion of the semi-structured data collection sheet.

Confidentiality: All information obtained from participants was kept confidential and accessible only to the researchers.

Right to Refuse

Participants had the right to refuse to answer any question, partially or completely, and could withdraw from the study at any time without consequence.

Research Guideline: The study was conducted following the guidelines of the Bangladesh Medical Research Council (BMRC).

RESULTS

Figure 1: Distribution of Eclamptic Patients According to Mode of Delivery

Vaginal delivery was the predominant mode of delivery, accounting for 55 patients (55.0%), while 45 patients (45.0%) underwent caesarean section.

Table 1: Demographic Characteristics of Eclamptic Patients According to Mode of Delivery

Category	Parameter	Vaginal Delivery (n=55)	Caesarean Section (n=45)	χ^2	p-value
Age	≤20 years	10 (18.2%)	6 (13.3%)	2.92	0.404
	21–25 years	26 (47.3%)	20 (44.4%)		
	26–30 years	19 (34.5%)	17 (37.8%)		
	>30 years	0 (0.0%)	2 (4.4%)		
	Mean ± SD	24.61 ± 3.43	25.08 ± 3.63		
	Range	16–35	18–34		
Parity	Primigravida	42 (76.4%)	30 (66.7%)	1.15	0.283
	Multigravida	13 (23.6%)	15 (33.3%)		
Education	Illiterate	22 (40.0%)	11 (24.4%)	3.87	0.276
	Primary	26 (47.3%)	29 (64.5%)		
	Secondary	4 (7.3%)	4 (8.9%)		
	Higher secondary	3 (5.5%)	1 (2.2%)		
Socioeconomic Status	Poor	37 (67.3%)	34 (75.6%)	0.86	0.836
	Lower middle	11 (20.0%)	7 (15.6%)		
	Upper middle	5 (9.1%)	3 (6.7%)		
	Upper	2 (3.6%)	1 (2.2%)		

Most patients were aged 21–25 years, with mean ages of 24.61 ± 3.43 years and 25.08 ± 3.63 years in the vaginal and caesarean groups, respectively. Primigravida women predominated in both groups,

while primary education and poor socioeconomic status were most common. No significant differences were observed between the groups ($p>0.05$).

Table 2: Antenatal Care and Clinical Characteristics of Eclamptic Patients According to Mode of Delivery

Category	Parameter	Vaginal Delivery (n=55)	Caesarean Section (n=45)	χ^2	p-value
Antenatal Care	No antenatal visits	12 (21.8%)	11 (24.4%)	3.06	0.216
	Irregular	22 (40.0%)	24 (53.3%)		
	Regular	21 (38.2%)	10 (22.2%)		
Gestational Age	<37 weeks	33 (60.0%)	31 (68.9%)	0.85	0.357
	≥37 weeks	22 (40.0%)	14 (31.1%)		
	Mean $\pm$ SD (weeks)	33.7 ± 3.14	34.25 ± 6.49		
	Range (weeks)	27–39	29–39		
Blood Pressure	Systolic BP, mean $\pm$ SD (mmHg)	154.5 ± 20.83	159.3 ± 24.5	—	—
	Systolic BP, range (mmHg)	105–180	100–190	—	—
	Diastolic BP, mean $\pm$ SD (mmHg)	97.7 ± 11.22	97.0 ± 12.5	—	—
	Diastolic BP, range (mmHg)	85–110	80–115	—	—
Clinical Symptoms	Headache, blurring of vision and/or epigastric pain	47 (85.4%)	38 (84.4%)	—	—
Anticonvulsant Use	No anticonvulsants before admission	35 (63.6%)	31 (68.9%)	0.3	0.581
	With anticonvulsants	20 (36.4%)	14 (31.1%)		
Convulsions Before Admission	Mean $\pm$ SD	7.17 ± 2.19	5.4 ± 1.4	—	—
	Range	2–12	3–11	—	—
Interval From First Convulsion to Admission	<6 hours	22 (40.0%)	21 (46.7%)	0.62	0.733
	6–12 hours	25 (45.5%)	17 (37.8%)		
	>12 hours	8 (14.5%)	7 (15.6%)		
	Mean $\pm$ SD (hours)	7.19 ± 4.98	6.4 ± 4.81		
	Range (hours)	3–15	4–13		
Interval From First Convulsion to Delivery	<12 hours	22 (40.0%)	21 (46.7%)	0.45	0.503
	>12 hours	33 (60.0%)	24 (53.3%)		
Urine Albumin	(+)	0 (0.0%)	0 (0.0%)	6.75	0.034
	(++)	33 (60.0%)	24 (53.3%)		
	(+++)	11 (20.0%)	18 (40.0%)		
	(++++)	11 (20.0%)	3 (6.7%)		

Irregular antenatal visits were more common in the caesarean group (53.3%), while regular visits were more frequent in the vaginal delivery group (38.2%). Preterm delivery occurred in 60.0% and 68.9% of the vaginal and caesarean groups, respectively, while

headache, blurring of vision and/or epigastric pain were reported by 85.4% and 84.4%, respectively. Urinary albumin distribution differed significantly between the groups ($p=0.034$).

Table 3: Maternal Mortality and Morbidity According to Mode of Delivery

Category	Maternal Outcome	Vaginal Delivery (n=55), No. (%)	Caesarean Section (n=45), No. (%)
Maternal Mortality	No maternal death	52 (94.5%)	44 (97.8%)
	Maternal death	3 (5.5%)	1 (2.2%)
Maternal Morbidity	Abruptio placenta	3 (5.5%)	5 (11.1%)
	Pulmonary edema	5 (9.1%)	1 (2.2%)
	Obstetric shock	2 (3.6%)	0 (0.0%)
	Cerebrovascular accident	8 (14.5%)	5 (11.1%)
	Wound infection	0 (0.0%)	2 (4.4%)
	Postpartum hemorrhage	3 (5.5%)	2 (4.4%)
	Renal failure	3 (5.5%)	2 (4.4%)
	Puerperal psychosis	1 (1.8%)	0 (0.0%)
	Total morbidity	25 (45.5%)	17 (37.8%)

Maternal death occurred in 3 patients (5.5%) following vaginal delivery and 1 patient (2.2%)

following caesarean section, while overall maternal morbidity occurred in 25 (45.5%) and 17 patients

(37.8%), respectively. Cerebrovascular accident was the most frequent maternal complication in both groups, occurring in 14.5% and 11.1%, respectively.

Table 4: Intensive Care Unit Referral According to Mode of Delivery

ICU referral	Vaginal delivery (n=55)	Caesarean section (n=45)	Total	p-value
Yes	16 (29.1%)	4 (8.9%)	20	0.012
No	39 (70.9%)	41 (91.1%)	80	
Total	55 (100%)	45 (100%)	100	

ICU referral was required in 16 patients (29.1%) following vaginal delivery compared with 4 patients (8.9%) following caesarean section. The difference was statistically significant ($p=0.012$).

Table 5: Major Organ Complications According to Mode of Delivery

Category	Complication	Vaginal Delivery (n=55), No. (%)	Caesarean Section (n=45), No. (%)	Total, No.	p-value
Renal	Oliguria	12 (21.8%)	14 (31.1%)	26	0.656
	Anuria	3 (5.5%)	1 (2.2%)	4	
	Acute renal failure	3 (5.5%)	2 (4.4%)	5	
	No renal complication	37 (67.3%)	28 (62.2%)	65	
Pulmonary	Edema	5 (9.1%)	1 (2.2%)	6	0.355
	Pneumonia	0 (0.0%)	1 (2.2%)	1	
	Embolism	2 (3.6%)	2 (4.4%)	4	
	No pulmonary complication	48 (87.3%)	41 (91.1%)	89	
Cerebral	Edema	7 (12.7%)	3 (6.7%)	10	0.470
	Hemorrhage	1 (1.8%)	2 (4.4%)	3	
	No cerebral complication	47 (85.5%)	40 (88.9%)	87	
Hepatic	Hepatic failure	0 (0.0%)	1 (2.2%)	1	0.237
	Subcapsular hemorrhage	2 (3.6%)	0 (0.0%)	2	
	HELLP syndrome	4 (7.3%)	1 (2.2%)	5	
	No hepatic complication	49 (89.1%)	43 (95.6%)	92	
Hematological	Thrombocytopenia	5 (9.1%)	3 (6.7%)	8	0.473
	HELLP syndrome	4 (7.3%)	1 (2.2%)	5	
	DIC	1 (1.8%)	0 (0.0%)	1	
	No hematological complication	45 (81.8%)	41 (91.1%)	86	

Oliguria was the most frequent renal complication, occurring in 21.8% of the vaginal delivery group and 31.1% of the caesarean section group. Cerebral edema occurred in 12.7% and 6.7%,

respectively, while no significant differences were observed in renal, pulmonary, cerebral, hepatic or hematological complications between the groups (all $p>0.05$).

Table 6: Postpartum Complications According to Mode of Delivery

Postpartum complication	Vaginal delivery (n=55)	Caesarean section (n=45)	Total	p-value
Shock	2 (3.6%)	0 (0.0%)	2	0.176
Sepsis	4 (7.3%)	1 (2.2%)	5	
Hemorrhage	2 (3.6%)	0 (0.0%)	2	
No complication	47 (85.5%)	44 (97.8%)	91	
Total	55 (100%)	45 (100%)	100	

Most patients had no postpartum complications (85.5% following vaginal delivery and 97.8% following caesarean section). Sepsis was the most frequent

postpartum complication, occurring in 7.3% and 2.2%, respectively, with no significant difference between the groups ($p=0.176$).

Table 7: Causes of Maternal Mortality According to Mode of Delivery

Cause of maternal mortality	Vaginal delivery (n=3), No. (%)	Caesarean section (n=1), No. (%)
Pulmonary edema	1 (33.3%)	0 (0.0%)
Cerebrovascular accident	1 (33.3%)	0 (0.0%)
HELLP syndrome	1 (33.3%)	1 (100.0%)

Among the four maternal deaths, three occurred following vaginal delivery and one following caesarean section. Pulmonary edema, cerebrovascular accident and HELLP syndrome each accounted for one death (33.3%) following vaginal delivery, while the single death following caesarean section was associated with HELLP syndrome (100.0%).

DISCUSSION

In this cross-sectional study conducted at the Eclampsia Ward, Department of Gynecology and Obstetrics, Dhaka Medical College Hospital, maternal outcomes were compared between 100 women with antepartum eclampsia according to mode of delivery. Vaginal delivery was more common than caesarean section, and although maternal morbidity and mortality were numerically higher following vaginal delivery, ICU referral was significantly more frequent in this group, while no significant differences were observed in major organ or postpartum complications.

In the present study, vaginal delivery was the predominant mode of delivery, accounting for 55.0% of women with eclampsia, while 45.0% underwent caesarean section. This finding was broadly comparable with the study by Begum *et al.*, [16], which included 100 women with eclampsia and reported an equal distribution between vaginal delivery and caesarean section, with 50.0% of women delivered by each mode. Although the proportion of vaginal delivery was slightly higher in the present study, both studies demonstrated that vaginal delivery constituted approximately half of deliveries among women with eclampsia. The relatively similar distribution may reflect comparable obstetric management practices in tertiary-care settings, where the mode of delivery is generally determined by the maternal and fetal condition, cervical status, labour progress, gestational age, and other obstetric indications. Thus, the predominance of vaginal delivery in the present study does not necessarily indicate a preference for one mode of delivery, but may reflect the clinical circumstances of individual women with eclampsia.

The present study showed that most women with eclampsia were aged 21–25 years, with similar proportions in the vaginal and caesarean delivery groups (47.3% vs. 44.4%), and the mean ages were also comparable between the groups (24.61 ± 3.43 vs. 25.08 ± 3.63 years; $p=0.404$). Primigravida women predominated in both groups (76.4% vs. 66.7%; $p=0.283$), while illiteracy was more frequent among women undergoing vaginal delivery (40.0% vs. 24.4%) and primary education was more common in the caesarean group (64.5% vs. 47.3%; $p=0.276$). Poor socioeconomic status was prevalent in both groups (67.3% vs. 75.6%; $p=0.836$). These findings were broadly consistent with Akter *et al.*, [17], who also reported similar proportions of young women and primigravidas between the vaginal and caesarean groups, with illiteracy more common among vaginal deliveries

and primary education more frequent among caesarean deliveries, although their study found a significantly lower mean age among women delivering vaginally. Similarly, Irene *et al.*, [18], reported that maternal age and most sociodemographic characteristics were not significantly associated with mode of delivery, supporting the present finding of no significant association between age and delivery mode. However, their observation of increased odds of caesarean delivery among women with lower education suggests that educational status may influence delivery decisions in some settings, although no significant association was observed in the present study. Overall, the similarity in demographic characteristics between the two groups suggests that major sociodemographic differences were unlikely to account for the observed differences in maternal outcomes according to mode of delivery.

The present study demonstrated broadly comparable antenatal and clinical characteristics between women undergoing vaginal and caesarean delivery. Although irregular antenatal care was more common in the caesarean group (53.3% vs. 40.0%) and regular antenatal care was more frequent in the vaginal delivery group (38.2% vs. 22.2%), the difference was not statistically significant ($p=0.216$). Preterm gestation was common in both groups (60.0% vs. 68.9%; $p=0.357$), while blood pressure, clinical symptoms, anticonvulsant use, number of convulsions, and intervals from the first convulsion to admission and delivery were also broadly comparable. These findings were largely consistent with Chaudhuri *et al.*, [19], who reported similar gestational age, number of convulsions, blood pressure, and proteinuria profiles between planned vaginal and caesarean groups, although their study found significantly higher antenatal care uptake among women undergoing caesarean delivery. In contrast, the present study demonstrated a significant difference in urinary albumin distribution ($p=0.034$). Higher-grade proteinuria was more frequent in the vaginal delivery group for ++++ albumin (20.0% vs. 6.7%), whereas +++ albumin was more common in the caesarean group (40.0% vs. 20.0%). Despite this difference in proteinuria distribution, most other clinical parameters were similar between the groups. Overall, the similarity in the majority of clinical characteristics suggests that the vaginal and caesarean groups had generally comparable baseline clinical profiles, although differences in the severity of proteinuria were evident.

The present study demonstrated a higher overall maternal morbidity following vaginal delivery than caesarean section (45.5% vs. 37.8%), while maternal mortality was also numerically higher following vaginal delivery (5.5% vs. 2.2%). Cerebrovascular accident was the most frequent maternal complication in both groups (14.5% vs. 11.1%), while pulmonary edema and obstetric shock were observed more frequently following vaginal delivery. These findings were broadly consistent with Begum *et al.*, [16], who reported substantially

higher maternal morbidity following vaginal delivery compared with caesarean section (56% vs. 36%), although maternal mortality was identical in their two groups at 4%. Similarly, Khandoker *et al.*, [20], observed significantly greater maternal complications following vaginal delivery than caesarean section (46% vs. 16%), with postpartum hemorrhage and abruptio placentae among the important complications. In the present study, however, abruptio placenta was more frequent following caesarean section than vaginal delivery (11.1% vs. 5.5%), while postpartum hemorrhage occurred at relatively similar frequencies (5.5% vs. 4.4%). These differences in individual complication patterns may reflect variations in patient characteristics, disease severity, obstetric indications, and management practices across study settings. Nevertheless, the overall findings of the present study are in keeping with the pattern reported in previous studies of a greater maternal morbidity burden among women with eclampsia who underwent vaginal delivery, although the observed difference in the present study was not tested for statistical significance.

ICU referral was significantly more frequent among women undergoing vaginal delivery than among those undergoing caesarean section (29.1% vs. 8.9%, $p=0.012$), indicating that women in the vaginal delivery group experienced a greater need for intensive maternal care. This finding was consistent with the results of Chaudhuri *et al.*, [19], who reported life-threatening maternal complications in 56.5% of women with planned vaginal delivery compared with 21.7% of those undergoing caesarean delivery ($p<0.000002$). Their observation of more frequent respiratory, vascular, and postpartum complications among women undergoing vaginal delivery further supports the present finding of a greater requirement for intensive care among this group. The higher frequency of ICU referral in the vaginal delivery group may therefore reflect the greater burden of severe maternal complications observed in these women. However, as the present study was observational, this association should be interpreted cautiously, since the mode of delivery may itself have been influenced by the underlying severity of maternal disease and other clinical factors.

The present study found no statistically significant differences in renal, pulmonary, cerebral, hepatic, or hematological complications between women undergoing vaginal and caesarean delivery (all $p>0.05$). Oliguria was more frequent following caesarean section than vaginal delivery (31.1% vs. 21.8%), whereas pulmonary edema (9.1% vs. 2.2%), cerebral edema (12.7% vs. 6.7%), and HELLP syndrome (7.3% vs. 2.2%) were more common following vaginal delivery. These findings were broadly consistent with Irene *et al.*, [18], who similarly reported no significant differences in major organ complications between vaginal and caesarean groups. In their study, kidney injury occurred in 20.8% of vaginal deliveries compared with 10.3% of

caesarean deliveries ($p=0.444$), while true HELLP syndrome occurred in 20.8% and 20.7%, respectively ($p=1.000$). Thus, despite differences in the distribution of individual organ complications, both studies demonstrated that major renal, hepatic, cerebral, pulmonary, and hematological complications were not significantly associated with mode of delivery. The absence of statistically significant differences in the present study suggests that the occurrence of major organ complications may be influenced by the underlying severity and systemic effects of eclampsia rather than by mode of delivery alone.

Most women in the present study had no postpartum complications, with the proportion being higher following caesarean section than vaginal delivery (97.8% vs. 85.5%); however, the overall difference was not statistically significant ($p=0.176$). Shock and hemorrhage occurred only following vaginal delivery (3.6% each), while sepsis was more frequent after vaginal delivery than caesarean section (7.3% vs. 2.2%). These findings were broadly consistent with Dixit *et al.*, [21], who reported a higher frequency of postpartum hemorrhage following vaginal delivery than caesarean section (15.0% vs. 4.5%, $p=0.332$), although the difference was not statistically significant. Their study also reported higher ventilation requirements among women undergoing vaginal delivery, while other maternal complications did not differ significantly between the delivery groups. Thus, both studies demonstrated a tendency toward greater postpartum morbidity following vaginal delivery, although the differences did not reach statistical significance. The relatively low frequency of individual postpartum complications in the present study may also have limited the statistical power to detect differences between the two delivery groups.

Among the four maternal deaths in the present study, three occurred following vaginal delivery and one following caesarean section. Pulmonary edema, cerebrovascular accident, and HELLP syndrome each accounted for one death following vaginal delivery (33.3% each), while the single maternal death following caesarean section was associated with HELLP syndrome (100.0%). These findings were broadly consistent with Begum *et al.*, [16], who identified pulmonary edema as the leading cause of maternal mortality (46.3%), followed by cerebrovascular accident or coma (23.5%), while HELLP syndrome accounted for 5.9% of deaths. Their study also identified disseminated intravascular coagulation, postpartum hemorrhage with irreversible shock, abruptio placentae with shock, renal failure, hepatic failure, and heart failure as other causes of maternal mortality. Thus, both studies highlight pulmonary and neurological complications, together with HELLP syndrome, as important contributors to maternal mortality among women with eclampsia. The present findings particularly emphasize the serious consequences of pulmonary and cerebrovascular

complications, which were also prominent among the maternal complications observed in the overall cohort. However, because only four maternal deaths occurred in the present study, the distribution of specific causes of death should be interpreted cautiously, and no definitive conclusion regarding the superiority of either mode of delivery in preventing maternal death can be drawn from these data.

Limitations of the Study

The study had several limitations:

- The study was conducted at a single tertiary-care hospital, which may limit the generalizability of the findings to the wider population of Bangladesh.
- The study included a relatively small sample size. A larger sample with a longer study period might have provided more robust and generalizable findings.
- As participants were not followed up after hospital discharge, late or chronic maternal complications, such as chronic hypertension, chronic renal disease, and postpartum eclampsia, could not be assessed.
- Being a hospital-based study, the findings may not reflect the actual incidence or burden of eclampsia and its complications in the community.
- The duration of postpartum follow-up was relatively short, particularly among women who underwent normal vaginal delivery. Due to limited hospital bed availability, these patients were often discharged early, restricting follow-up to the period of their hospital stay.
- Some important adverse maternal and neonatal outcomes, including pulmonary edema, cerebrovascular accident, stillbirth, and perinatal death, occurred during the study period; however, the relatively small sample size limited the ability to draw definitive conclusions regarding their association with mode of delivery.
- The observational design and purposive sampling may have introduced selection bias and limited the ability to establish a causal relationship between mode of delivery and maternal outcomes.

CONCLUSION

Eclampsia is a severe obstetric complication associated with considerable maternal morbidity and mortality. This study found that vaginal delivery was associated with higher maternal morbidity, mortality, and significantly greater ICU referral than caesarean section, although major organ dysfunction and postpartum complications were comparable between groups. Pulmonary edema, cerebrovascular accident, and HELLP syndrome were the main causes of maternal death. Overall, individualized delivery planning based

on maternal and fetal condition remains essential. Our country, especially community and village populations, should be more aware of eclampsia, pregnancy-associated hypertension, and their associated complications. Hospital delivery is a must for these situations, where NVD (normal vaginal delivery), C-section, and ICU facilities are available. If we can ensure careful follow-up, we can avoid maternal mortality and morbidity. As immediate termination is needed in eclampsia patients, C-sections reduce mortality and morbidity of the mother and baby to a larger extent.

REFERENCES

1. Magley M, Hinson MR. Eclampsia. [Updated 2020 Feb 1]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK554392/>
2. Félix E, Yemga DV, Um Meka EN. Eclampsia in African Milieu, Yaounde-Cameroon: epidemiology, seasonal variations and treatment regimen. *Obstet Gynecol Int J*. 2019;10(3):176-83.
3. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, Gülmezoglu AM, Temmerman M, Alkema L. Global causes of maternal death: a WHO systematic analysis. *The Lancet global health*. 2014 Jun 1;2(6):e323-33.
4. Eclampsia US. Medscape. 2019. Available from: <https://emedicine.medscape.com/article/253960-overview>
5. Lam MT, Dierking E. Intensive Care Unit issues in eclampsia and HELLP syndrome. *International journal of critical illness and injury science*. 2017 Jul;7(3):136.
6. Ahonen J, Nuutila M. HELLP syndrome--severe complication during pregnancy. *Duodecim; Laaketieteellinen Aikakauskirja*. 2012 Jan 1;128(6):569-77.
7. Bartal MM, Sibai MB. Eclampsia in the 21st century. *American journal of obstetrics and gynecology*. 2022 Feb 1;226(2):S1237-53.
8. Vousden N, Lawley E, Seed PT, Gidiri MF, Goudar S, Sandall J, Chappell LC, Shennan AH, CRADLE Trial Collaborative Group. Incidence of eclampsia and related complications across 10 low-and middle-resource geographical regions: Secondary analysis of a cluster randomised controlled trial. *PLoS medicine*. 2019 Mar 29;16(3):e1002775.
9. Townsend R, O'Brien P, Khalil A. Current best practice in the management of hypertensive disorders in pregnancy. *Integrated blood pressure control*. 2016 Jul 27:79-94.
10. Mundle S, Mullik I. Risk factors in pregnancy outcome in eclampsia. In *Abstracts Free Communication Papers*. 42nd All India congress of Obstetrics and Gynecology 1998.
11. Mathi M, Sanghvi H. Guidotti Rj; major contributors. *Managing complications in pregnancy and childbirth: a guide for midwives and doctors*.

- Geneva: Department of reproductive Health and Research. World Health Organisation. 2000;543.
12. Kumari P, Singh S, Khatun S. Comparative study of vaginal delivery and caesarean section in antepartum eclampsia at tertiary care hospital. *Int J Reprod Contracept Obstet Gynecol*. 2017 Feb 1;6(2):457-60.
 13. Saeed G, Wajid R, Dar AY. Maternal mortality in eclampsia after cesarean section versus vaginal delivery. *Annals of King Edward Medical University*. 2017 Oct 1;23(4):451-5.
 14. Seal SL, Ghosh D, Kamilya G, Mukherji J, Hazra A, Garain P. Does route of delivery affect maternal and perinatal outcome in women with eclampsia? A randomized controlled pilot study. *American journal of obstetrics and gynecology*. 2012 Jun 1;206(6):484-e1.
 15. Tukur J, Umar NI, Khan N, Musa D. Comparison of emergency caesarean section to misoprostol induction for the delivery of antepartum eclamptic patients: a pilot study. *Nigerian Journal of Medicine*. 2007;16(4):364-7.
 16. Begum S, Islam F, Jahan AA. Feto-maternal outcomes in cesarean section compared to vaginal delivery in eclamptic patients in a tertiary level hospital. *Journal of Enam Medical College*. 2013 Aug 7;3(2):77-83.
 17. Akter N, Rahman T, Jeasmin M, Sultana MN. A study of Maternal and Fetal outcome Following Caesarean Section Versus Vaginal Delivery in Eclamptic Patients in Six Months Study in Rangpur Medical College and Hospital, Rangpur. *The Insight*. 2025;8(04):807-12.
 18. Irene K, Amubumombe PP, Mogeni R, Andrew C, Mwangi A, Omengo OE. Maternal and perinatal outcomes in women with eclampsia by mode of delivery at Riley mother baby hospital: a longitudinal case-series study. *BMC Pregnancy Childbirth*. 2021 Jun 24;21(1):439.
 19. Chaudhuri S, Giri DK, Mondal A, Rani R, Janani V, Mundle M. Comparison of Fetomaternal Outcome Between Planned Vaginal Delivery and Planned Cesarean Section in Women with Eclampsia: Observational Study. *J Obstet Gynaecol India*. 2021 Aug;71(4):369-378.
 20. Khandoker M, Joy SB, Das SK, Biswas AK. Comparative study on fetomaternal outcome after lower uterine segment caesarean section and vaginal delivery in eclamptic patient. *Faridpur Medical College Journal*. 2020 Sep 9;15(1):16-20.
 21. Dixit P, Mishra TK, Nargawe D, Singh S. Maternal and Perinatal Outcome in Patients With Eclampsia: A Study Done at a Tertiary Care Centre. *Cureus*. 2023 Sep 26;15(9):e45971.
 22. Begum MR, Begum A, Quadir E, Akhter S, Shamsuddin L. Eclampsia: still a problem in Bangladesh. *MedGenMed*. 2004 Oct 8;6(4):52.