Original Research Paper

Volume - 16 | Issue - 07 | July - 2026 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Obstetrics & Gynaecology

STUDY OF FETOMATERNAL OUTCOME OF VAGINAL DELIVERY VERSUS CAESAREAN SECTION IN ANTEPARTUM ECLAMPSIA AT A TERTIARY CARE CENTRE IN MAHARASHTRA

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ABSTRACT **Background:** Antepartum eclampsia remains an important obstetric emergency associated with significant maternal and neonatal morbidity. Although delivery is the definitive treatment, the optimal route of delivery depends on maternal condition, fetal status, gestational age, cervical favourability, and obstetric indication. Present study was aimed to compare fetomaternal outcomes among women with antepartum eclampsia delivered vaginally and those delivered by caesarean section at a tertiary care centre. **Methods:** This prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Government Medical College, Chhatrapati Sambhajinagar, Maharashtra. **Results:** The study included 64 vaginal deliveries and 78 caesarean deliveries. Rural residence was recorded in 98 women, and lower or lower-middle socioeconomic status was documented in 104 women. Maternal complications included postpartum haemorrhage, pulmonary oedema, renal failure, placental abruption, disseminated intravascular coagulation, and HELLP syndrome. ICU admission was required in 33 women, ventilatory support in 19 women, and 4 maternal deaths were recorded. NICU admission was required in 72 neonates, and 11 stillbirths were documented. No statistically significant difference was observed between vaginal delivery and caesarean section groups for key maternal or neonatal outcomes. **Conclusion:** Fetomaternal outcomes in antepartum eclampsia were comparable between vaginal delivery and caesarean section groups. The route of delivery should be individualized rather than determined solely by the diagnosis of eclampsia.

KEYWORDS : Antepartum Eclampsia; Caesarean Section; Vaginal Delivery; Maternal Outcome; Neonatal Outcome; Magnesium Sulphate; Tertiary Care Centre.

INTRODUCTION

Eclampsia is defined as the occurrence of new-onset generalized tonic-clonic seizures, focal seizures, or unexplained coma in a woman with pre-eclampsia, after excluding other neurological causes. It represents one of the most severe manifestations of hypertensive disorders of pregnancy and continues to contribute substantially to preventable maternal and perinatal morbidity, especially in low- and middle-income countries. Contemporary guidelines emphasize that eclampsia is a clinical emergency requiring rapid stabilization, seizure control, blood pressure management, fetal assessment, and planning for delivery. [1–4]

The fetomaternal consequences of antepartum eclampsia are mediated through systemic endothelial dysfunction, uteroplacental insufficiency, neurological complications, coagulopathy, and medically indicated preterm delivery. Maternal complications may include postpartum haemorrhage, placental abruption, HELLP syndrome, pulmonary oedema, acute kidney injury, disseminated intravascular coagulation, cerebrovascular complications, need for intensive care, and maternal death. Neonatal outcomes are influenced by gestational age, birth weight, intrauterine growth restriction, birth asphyxia, respiratory distress, stillbirth, and need for neonatal intensive care. Magnesium sulphate remains the standard anticonvulsant for prevention and treatment of eclamptic seizures, while timely delivery remains the definitive management after maternal stabilization. [3,5,6,7]

The preferred route of delivery in antepartum eclampsia remains clinically debated. Caesarean section allows rapid delivery in selected patients with fetal distress, unfavourable cervix, failed induction, or deteriorating maternal condition, whereas vaginal delivery avoids operative and anaesthetic risks in stabilized women with favourable obstetric conditions. Evidence from randomized and systematic review data has not established universal superiority of either route; therefore, individualized decision-making remains central. [8,9] Present study was undertaken to compare fetomaternal outcomes among women with antepartum eclampsia delivered vaginally and those delivered by caesarean section.

MATERIALS AND METHODS

This was a prospective observational study conducted in the Department of Obstetrics and Gynaecology, Government Medical College, Chhatrapati Sambhajinagar, Maharashtra, The study was conducted over a period of 24 months, from April 2024 to March 2026. Institutional Ethics Committee approval was obtained before initiation of the study. Written informed consent was obtained from all participants in the local language.

Inclusion Criteria

- Pregnant women aged more than 18 years, gestational age more than 28 weeks, presenting with antepartum eclampsia or developing antepartum eclampsia during hospital stay, delivered at the study institute.
- Women willing to participate, with written informed consent obtained from the patient or next of kin where required.

Exclusion Criteria

- Women not willing to participate.
- Women with intrapartum or postpartum eclampsia.
- Women with known epilepsy or seizures due to other neurological pathology.
- Women not delivered at the study institute.

All eligible women were evaluated using a structured proforma. A total of 142 women were included and analysed according to mode of delivery: 64 in the vaginal delivery group and 78 in the caesarean section group.

Sociodemographic details, obstetric history, antenatal registration status, number of antenatal visits, referral status, high-risk factors, clinical findings at admission, blood pressure, consciousness level, seizure history, and laboratory parameters were recorded. Baseline investigations included complete blood count, platelet count, liver function tests, renal function tests, coagulation profile, serum electrolytes, urine protein assessment, blood grouping and cross-matching, and other investigations as clinically indicated.

All women were managed according to departmental protocol. Initial management included airway protection, prevention of injury, seizure control, blood pressure control, maternal stabilization, and fetal assessment. Magnesium sulphate was administered using Pritchard or Zuspan regimen as clinically appropriate. Antihypertensive therapy was provided using standard agents such as labetalol and/or nifedipine. The decision regarding mode of delivery was taken by the treating senior obstetrician after considering maternal condition, fetal status, gestational age, cervical favourability, progress of labour, and obstetric indications.

Categorical variables were expressed as numbers and percentages and

compared using Chi-square test or Fisher's exact test, as applicable. Continuous variables were summarized using mean values where available. A p-value less than 0.05 was considered statistically significant.

RESULTS

Out of 142 women, 72 were aged 25 years or below, 52 were aged 26–30 years, and 18 were aged above 30 years. Rural residence was recorded in 98 women. Lower or lower-middle socioeconomic status was recorded in 104 women. Age, residence, education, and socioeconomic status did not show statistically significant difference between delivery groups.

Table 1. Sociodemographic profile

Variable	Category	Vaginal (n=64)	LSCS (n=78)	Total (n=142)	p-value
Age	≤25 years	31 (48.4%)	41 (52.6%)	72 (50.7%)	0.918
	26–30 years	25 (39.1%)	27 (34.6%)	52 (36.6%)	
	>30 years	8 (12.5%)	10 (12.8%)	18 (12.7%)	
Residence	Rural	44 (68.8%)	54 (69.2%)	98 (69.0%)	1.000
	Urban	20 (31.2%)	24 (30.8%)	44 (31.0%)	
Socio-economic status	Lower/lower-middle	46 (71.9%)	58 (74.4%)	104 (73.2%)	0.989
	Middle/upper-middle	18 (28.1%)	20 (25.6%)	38 (26.8%)	

Primigravidae accounted for 54 women and multigravidae for 88 women. Antenatal registration was present in 130 women, while 12 were unregistered. A total of 74 women had zero to two antenatal visits and 68 women had three or more visits. Gravida, parity, antenatal registration, and ANC visit distribution did not differ significantly between groups.

Table 2. Obstetric Profile and Antenatal Care Status

Variable	Category	Vaginal (n=64)	LSCS (n=78)	Total (n=142)	p-value
Gravida	G1	25 (39.1%)	29 (37.2%)	54 (38.0%)	0.959
	G2 and above	39 (60.9%)	49 (62.8%)	88 (62.0%)	
Parity	P0	23 (35.9%)	32 (41.0%)	55 (38.7%)	0.939
	P1 and above	41 (64.1%)	46 (59.0%)	87 (61.3%)	
ANC registration	Registered	59 (92.2%)	71 (91.0%)	130 (91.5%)	0.726
	Un-registered	5 (7.8%)	7 (9.0%)	12 (8.5%)	
ANC visits	0–2 visits	31 (48.4%)	43 (55.1%)	74 (52.1%)	0.881
	≥3 visits	33 (51.6%)	35 (44.9%)	68 (47.9%)	
Chronic hypertension	Present	9 (14.1%)	14 (17.9%)	23 (16.2%)	0.649
Previous LSCS	Present	7 (10.9%)	9 (11.5%)	16 (11.3%)	1.000

At admission, 93 women were conscious and 49 were unconscious. Antihypertensive therapy was administered to all 142 women, and intubation was required in 16 women. Systolic blood pressure distribution, consciousness status, and intubation requirement did not show statistically significant difference between groups.

Table 3. Clinical Presentation and Admission Findings

Parameter	Category	Vaginal (n=64)	LSCS (n=78)	Total (n=142)	p-value
Consciousness	Conscious	46 (71.9%)	47 (60.3%)	93 (65.5%)	0.160
	Unconscious	18 (28.1%)	31 (39.7%)	49 (34.5%)	
Systolic BP	<150 mmHg	3 (4.7%)	1 (1.3%)	4 (2.8%)	0.498
	150–159 mmHg	22 (34.4%)	35 (44.9%)	57 (40.1%)	
	160–169 mmHg	14 (21.9%)	16 (20.5%)	30 (21.1%)	
	170–179 mmHg	19 (29.7%)	22 (28.2%)	41 (28.9%)	
	≥180 mmHg	6 (9.4%)	4 (5.1%)	10 (7.0%)	
Antihyper-tensive therapy	Given	64 (100%)	78 (100%)	142 (100%)	1.000
Intubation	Required	6 (9.4%)	10 (12.8%)	16 (11.3%)	0.600

Gestational age distribution was analysed according to mode of delivery. Out of 142 women, 34 were delivered at 28–32 weeks, 49 at 32–36 weeks, 55 at 36–40 weeks, and 4 beyond 40 weeks. Vaginal delivery was conducted in 64 women, while caesarean section was performed in 78 women. Among caesarean deliveries, 25 were elective and 53 were emergency procedures. Gestational age distribution did not differ significantly between vaginal delivery and caesarean section groups, with mean gestational age of 35.3 weeks in the vaginal delivery group and 35.4 weeks in the caesarean section group.

Table 4. Gestational Age at Delivery and Mode of Delivery

Variable	Category	Vaginal delivery n=64	Caesarean section n=78	Total N=142	p-value
Gestational age at delivery	28–32 weeks	18 (28.1%)	16 (20.5%)	34 (23.9%)	0.372
	32–36 weeks	19 (29.7%)	30 (38.5%)	49 (34.5%)	
	36–40 weeks	24 (37.5%)	31 (39.7%)	55 (38.7%)	
	>40 weeks	3 (4.7%)	1 (1.3%)	4 (2.8%)	
	Total	64 (100%)	78 (100%)	142 (100%)	
Mode of delivery	Vaginal delivery			64 (45.1%)	
	Total caesarean section			78 (54.9%)	
	Elective caesarean section			25 (17.6%)	
	Emergency caesarean section			53 (37.3%)	

PPH was recorded in 27 women, pulmonary oedema in 20, renal failure in 17, placental abruption in 8, DIC in 8, and HELLP syndrome in 4. ICU admission was required in 33 women, ventilatory support in 19, and 4 maternal deaths were recorded. None of the listed maternal complications or outcomes showed statistically significant difference between delivery groups.

Table 5. Maternal Complications and Maternal Outcome

Maternal parameter	Vaginal (n=64)	LSCS (n=78)	Total (n=142)	p-value
PPH	14 (21.9%)	13 (16.7%)	27 (19.0%)	0.520
Pulmonary oedema	9 (14.1%)	11 (14.1%)	20 (14.1%)	1.000
Renal failure	10 (15.6%)	7 (9.0%)	17 (12.0%)	0.300
Placental abruption	4 (6.3%)	4 (5.1%)	8 (5.6%)	1.000
DIC	3 (4.7%)	5 (6.4%)	8 (5.6%)	0.730
HELLP syndrome	2 (3.1%)	2 (2.6%)	4 (2.8%)	1.000
ICU admission	17 (26.6%)	16 (20.5%)	33 (23.2%)	0.429
Ventilatory support	6 (9.4%)	13 (16.7%)	19 (13.4%)	0.226
Maternal mortality	2 (3.1%)	2 (2.6%)	4 (2.8%)	1.000

Out of 142 births, 131 were live births and 11 were stillbirths. Live births occurred in 59 cases in the vaginal delivery group and 72 cases in the caesarean section group, while stillbirths were recorded in 5 and 6 cases, respectively. After excluding stillbirths from Apgar analysis, Apgar score below 7 at 1 minute was observed in 32 live-born neonates in the vaginal delivery group and 41 live-born neonates in the caesarean section group. At 5 minutes, Apgar score below 7 was observed in 16 live-born neonates in the vaginal delivery group and 24 live-born neonates in the caesarean section group. No statistically significant difference was observed between the two delivery groups for stillbirth, Apgar status among live births, or NICU admission among live births.

Table 6. Perinatal Status, Apgar Score and NICU Admission According to Mode of Delivery

Outcome	Category	Vaginal delivery	Caesarean section	Total	p-value
Perinatal status	Live birth	59/64 (92.2%)	72/78 (92.3%)	131/142 (92.3%)	1.000

	Stillbirth	5/64 (7.8%)	6/78 (7.7%)	11/142 (7.7%)	
Apgar score at 1 minute*	<7	32/59 (54.2%)	41/72 (56.9%)	73/131 (55.7%)	0.860
	7–10	27/59 (45.8%)	31/72 (43.1%)	58/131 (44.3%)	
Apgar score at 5 minutes*	<7	16/59 (27.1%)	24/72 (33.3%)	40/131 (30.5%)	0.568
	7–10	43/59 (72.9%)	48/72 (66.7%)	91/131 (69.5%)	
NICU admission*	Required	32/59 (54.2%)	40/72 (55.6%)	72/131 (55.0%)	1.000
	Not required	27/59 (45.8%)	32/72 (44.4%)	59/131 (45.0%)	

*among live births

Among neonates requiring NICU care, prematurity, birth asphyxia and low birth weight were the principal indications for admission. The pattern of NICU indications was similar in both delivery groups. This suggests that neonatal intensive care requirement was related mainly to prematurity and birth condition rather than the route of delivery.

Table 6A. Indications for NICU Admission Among Admitted Neonates

Outcome	Category	Vaginal delivery	Caesarean section	Total	p-value
Perinatal status	Live birth	59/64 (92.2%)	72/78 (92.3%)	131/142 (92.3%)	1.000
	Stillbirth	5/64 (7.8%)	6/78 (7.7%)	11/142 (7.7%)	
Apgar score at 1 minute*	<7	32/59 (54.2%)	41/72 (56.9%)	73/131 (55.7%)	0.860
	7–10	27/59 (45.8%)	31/72 (43.1%)	58/131 (44.3%)	
Apgar score at 5 minutes*	<7	16/59 (27.1%)	24/72 (33.3%)	40/131 (30.5%)	0.568
	7–10	43/59 (72.9%)	48/72 (66.7%)	91/131 (69.5%)	
NICU admission*	Required	32/59 (54.2%)	40/72 (55.6%)	72/131 (55.0%)	1.000
	Not required	27/59 (45.8%)	32/72 (44.4%)	59/131 (45.0%)	

Crude analysis of key maternal and neonatal outcomes showed no statistically significant difference between the vaginal delivery and caesarean section groups. The relative risk estimates were unadjusted and should not be interpreted as proof of equivalence. These results support individualized selection of delivery route based on maternal condition, fetal status and obstetric indications.

Table 7. Crude Comparison of Key Fetomaternal Outcomes Between Vaginal Delivery and Caesarean Section Groups

Outcome	Vaginal delivery	Caesarean section	Crude RR for LSCS vs vaginal delivery (95% CI)	p-value
Postpartum haemorrhage	14/64 (21.9%)	13/78 (16.7%)	0.76 (0.39–1.50)	0.520
Pulmonary oedema	9/64 (14.1%)	11/78 (14.1%)	1.00 (0.44–2.27)	1.000
Renal failure	10/64 (15.6%)	7/78 (9.0%)	0.57 (0.23–1.42)	0.300
Placental abruption	4/64 (6.3%)	4/78 (5.1%)	0.82 (0.21–3.15)	1.000
Disseminated intravascular coagulation	3/64 (4.7%)	5/78 (6.4%)	1.37 (0.34–5.51)	0.730
HELLP syndrome	2/64 (3.1%)	2/78 (2.6%)	0.82 (0.12–5.66)	1.000
ICU admission	17/64 (26.6%)	16/78 (20.5%)	0.77 (0.42–1.40)	0.429
Ventilatory support	6/64 (9.4%)	13/78 (16.7%)	1.78 (0.72–4.41)	0.226
Maternal mortality	2/64 (3.1%)	2/78 (2.6%)	0.82 (0.12–5.66)	1.000
Birth weight <2.5 kg†	52/64 (81.3%)	60/78 (76.9%)	0.95 (0.80–1.12)	0.822
Apgar score <7 at 5 minutes*	21/64 (32.8%)	30/78 (38.5%)	1.17 (0.75–1.84)	0.732
Stillbirth	5/64 (7.8%)	6/78 (7.7%)	0.98 (0.31–3.08)	1.000
NICU admission among live births	32/59 (54.2%)	40/72 (55.6%)	1.02 (0.75–1.40)	1.000

DISCUSSION

The present prospective observational study evaluated fetomaternal outcomes in women with antepartum eclampsia according to mode of delivery. The overall profile of the study population reflects the typical pattern seen in tertiary referral centres, where young women from rural and lower socioeconomic backgrounds frequently present with severe hypertensive complications of pregnancy. Similar demographic vulnerability has been described in Indian studies, including the prospective study by Prasad et al.,[10] from MGIMS, Sewagram, and the study by Joshi et al.,[11] on maternal and fetal outcome in eclampsia. The present findings support the importance of strengthening antenatal surveillance, community-level blood pressure screening, and early recognition of pre-eclampsia before progression to eclampsia.

Antenatal registration alone did not ensure adequate prevention of severe disease in the present cohort, as a clinically relevant proportion of women had limited antenatal visits. This observation is consistent with the wider Indian experience, where eclampsia is often linked not only to lack of registration but also to inadequate follow-up, delayed recognition of danger symptoms, and referral delays. Dixit et al.,[12] similarly emphasized that delayed treatment and inadequate antenatal care worsen maternal and perinatal outcomes in eclampsia. These findings suggest that antenatal care quality, frequency of visits, risk counselling, and timely referral are as important as registration status.

The obstetric profile showed that antepartum eclampsia was not confined to primigravid women, although primigravida status remains a recognized risk factor in classical teaching and in several published series. The presence of eclampsia among multigravid women highlights the need to maintain vigilance across all pregnancies, especially when chronic hypertension, previous hypertensive disease, fetal growth restriction, anaemia, or other risk factors are present. The ISSHP and ACOG recommendations emphasize structured assessment of women with hypertensive disorders of pregnancy and timely management to prevent severe maternal and fetal complications.[1,2]

Mode of delivery in eclampsia should be interpreted in the context of maternal stabilization, cervical favourability, fetal condition, and urgency of delivery. In the present study, caesarean section was used for standard obstetric and emergency indications, while vaginal delivery was achieved in a substantial proportion of women. This is consistent with the principle that eclampsia itself is not an automatic indication for caesarean section. Seal et al.,[9] in a randomized controlled pilot study, did not demonstrate superiority of a policy of early caesarean delivery over planned vaginal delivery in women with eclampsia at or beyond 34 weeks. The Cochrane review also concluded that robust randomized evidence is insufficient to mandate a universal planned caesarean approach in severe pre-eclampsia and related conditions.[8]

Maternal complications in the present study were distributed across both delivery groups without a statistically significant difference. This supports the interpretation that maternal outcome in antepartum eclampsia is influenced more by disease severity at presentation, timing of magnesium sulphate administration, control of severe hypertension, coagulopathy, neurological involvement, and availability of intensive care than by the route of delivery alone. ACOG, ISSHP, and WHO guidelines consistently emphasize magnesium sulphate for seizure prevention and treatment, prompt treatment of severe hypertension, and safe delivery after stabilization.[1–4] The Collaborative Eclampsia Trial and the Magpie Trial established magnesium sulphate as central to eclampsia management.[6,7]

Neonatal outcome in antepartum eclampsia is largely determined by prematurity, intrauterine growth restriction, placental insufficiency, birth asphyxia, and the need for neonatal intensive care. The present study found comparable neonatal outcomes between the two delivery groups, including Apgar score distribution and NICU admission. This supports individualized delivery planning rather than a uniform operative approach. Prasad et al. also reported substantial neonatal morbidity in eclampsia, especially related to prematurity and need for

neonatal care.[10] Similar findings have been reported in Indian studies where perinatal outcome is closely linked to gestational age at delivery, birth weight, and referral delay rather than mode of delivery alone.[11,12]

The comparison between vaginal delivery and caesarean section should therefore not be interpreted as a competition between two fixed strategies. Vaginal delivery remains appropriate when the mother is stabilized, fetal condition is reassuring, cervix is favourable, and delivery is expected within an acceptable time. Caesarean section is appropriate when there is fetal distress, failed induction, unfavourable cervix with need for urgent delivery, previous caesarean indication, malpresentation, abruption with obstetric indication, or deteriorating maternal status. The results of the present study are aligned with guideline-based obstetric practice, where the safest and fastest appropriate route is selected for the individual patient.

The strengths of this study include its prospective observational design, conduct at a tertiary referral centre managing high-risk obstetric emergencies, and direct comparative assessment of maternal and neonatal outcomes between vaginal delivery and caesarean section groups. Limitations include its single-centre design, observational nature, moderate sample size, potential selection bias because mode of delivery was determined clinically rather than by randomization, and absence of long-term maternal and neonatal follow-up.

CONCLUSION

Antepartum eclampsia remains a serious obstetric emergency requiring rapid stabilization and timely delivery. The present study showed comparable fetomaternal outcomes between vaginal delivery and caesarean section groups. Neither vaginal delivery nor caesarean section should be considered inherently superior in all women with antepartum eclampsia.

The route of delivery should be individualized according to maternal condition, fetal status, gestational age, cervical favourability, labour progress, and obstetric indication.

Vaginal delivery is an appropriate option in stabilized women with favourable obstetric conditions and reassuring fetal status. Caesarean section should be reserved for standard obstetric indications or situations requiring urgent delivery.

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