

Perinatal outcome of babies born to mothers with antepartum eclampsia: A study from tertiary care hospital of Central India



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ABSTRACT

Background: Eclampsia is a major cause of perinatal mortality. There is a need for studies that will correlate maternal factors and perinatal outcome, which will provide potential strategies to improve fetal outcomes in pregnancies complicated by eclampsia.

Aims and Objectives: This study aims to study perinatal outcome of babies born to mothers with antepartum eclampsia and to correlate outcomes with convulsion delivery interval. **Materials and Methods:** A study included 200 patients diagnosed and managed as antepartum eclampsia in the Department of Obstetrics and Gynaecology in MGM Medical College, Indore. A detailed pro forma was prepared and was filled with patient's information, investigations, treatment, and birth details. The final outcome of both, the mother and her newborn, including stillbirths and early neonatal deaths was included in the study and the perinatal outcome was correlated with convulsion delivery interval. **Results:** Incidence of antepartum eclampsia in our study was 2.1%. About 86.4% of women lack regular antenatal care at health care center. Only 7% of women delivered within 6 h of onset of convulsion. Case fatality rate was found to be 13%. There were 59.5% premature deliveries. Perinatal mortality (stillbirth and early neonatal deaths) was 42.5%. Significant association was found between convulsion delivery interval and perinatal outcome ($P < 0.05$). Furthermore, association between use of multiple antiepileptic agents and perinatal outcomes was statistically significant. **Conclusion:** Eclampsia being a major cause of perinatal mortality need early diagnosis, prompt referral from peripheral health centers, and timely intervention for improvising both perinatal and maternal outcomes.

Key words: Antenatal care; Eclampsia; Perinatal mortality; Pre-eclampsia

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INTRODUCTION

Pre-eclampsia, previously termed as “toxemia of pregnancy,” is multisystem disorder of pregnancy. It complicates approximately 5–8% of all pregnancies.¹

It has a highly variable clinical presentation but is usually associated with new-onset hypertension and proteinuria, occurring after 20 weeks of gestation. It carries increased risk of renal failure, cerebral and cardiovascular complications, placental abruption, and coagulopathy.

Eclampsia is defined as one or more generalized convulsions in a patient with signs and symptoms of pre-eclampsia, providing the absence of underlying neurologic disease.

Eclampsia remained a significant public health threat in both developed and developing countries contributing to maternal and perinatal mortality.² It is among the leading causes of maternal morbidity and mortality worldwide.³ The condition is much worse in the developing countries. The high rates of complications in the developing countries have been attributed to lack of antenatal and intrapartum care for many obstetrics population.⁴

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Common perinatal morbidities seen in babies born to mothers with eclampsia include intrauterine deaths, fetal growth restriction, prematurity, and perinatal asphyxia.

This study is conducted to assess perinatal outcome of antepartum eclampsia patients in a territory level hospital in Central India. The study will also correlate perinatal outcome with convulsion delivery interval.

Outcomes of the study will provide potential strategies, including importance of timely maternal stabilization and prompt referral to optimize fetal outcomes in pregnancies complicated by hypertensive disorders of pregnancy.

Aims and objectives

This study aims to study the perinatal outcome of babies born to mothers with antepartum eclampsia and to correlate perinatal outcome with convulsion delivery interval.

MATERIALS AND METHODS

This prospective, observational, single-centered study was conducted in a tertiary care hospital of Central India after approval from the Institutional Ethics Committee and written informed consent was obtained from the enrolled mothers.

A total of 200 mothers diagnosed and managed as antepartum eclampsia in the department of obstetrics and gynecology were traced from the obstetrics admission records on daily basis and were included in the study.

A structured pro forma was prepared and was filled from patient's file with reference to the patient's age, demographic profile, birth history, history of hypertensive disorders in previous pregnancy, antenatal care received, gestational age, number of seizure episodes, duration of first seizure episode, last referral site, and management received.

Data related to investigations and treatment given were noted. Blood pressure and proteinuria were examined at the time of admission, and highest blood pressure recorded during hospital stay were noted. All the cases were managed as obstetrics and gynecology treatment protocol.

Birth details including mode of delivery and indication for cesarean section were also mentioned. Following delivery, details of newborn including weight, gender, need for resuscitation, APGAR score, and indication of neonatal intensive care unit (NICU) admission, if needed, were noted.

The final outcome of both, the mother and her newborn, was recorded in the pro forma. All perinatal deaths

including stillbirths and early neonatal deaths within 7 days of birth were included in the study.

All the mothers admitted as antepartum eclampsia and babies born to these mothers, including stillbirths, were included in the study.

Statistical analysis

The collected data were processed through spreadsheet using Epi Info statistical software and tabulated in the form of tables and graphs.

Pearson Chi-square test was used to test relationship between variables. $P < 0.05$ was considered statistically significant.

RESULTS

During the present study, there were 9246 obstetric admissions, of which 200 patients presented with antepartum eclampsia, with an incidence of 2.1%.

Baseline characteristics of mothers with antepartum eclampsia were studied (Table 1). Mean maternal age in our study was 23.5 years. Majority, 172 (86%) women in our study lack regular antenatal care before delivery. Convulsion to delivery interval was found to be < 6 h only in 14 (7%) women. The convulsion delivery interval ranged from 2 h to 88 h with mean of 19.35%.

Out of 200 antepartum eclampsia mothers, 26 (13%) women died as result of complications. Common maternal complications, which were responsible for maternal mortality, were HELLP syndrome, disseminated intravascular coagulation, acute kidney injury, pulmonary edema, and intracerebral hemorrhage.

Neonatal outcomes are summarized in Table 2. Out of total 200 deliveries, 151 (75.5%) were live birth while 49 (24.5%) were stillbirths. One hundred and nineteen (59.5%) babies were born prematurely. Among preterm deliveries, maximum babies were born between 34 and 37 weeks' gestation (34%).

The most common indication for NICU admission were birth asphyxia in 55 (36.4%) babies, intrauterine growth retardation in 46 (30.4%) babies, and respiratory distress in 30 (19.9%) babies (Table 3).

Perinatal outcome was assessed at the 7th PND. There were 85 perinatal deaths, giving a perinatal mortality of 42.5%. These included 49 stillbirths and 36 early neonatal deaths (48.6%).

Birth asphyxia (48.6%) was the most common causes of early neonatal deaths, followed by sepsis, respiratory distress, and bilirubin encephalopathy (Figure 1).

Table 1: Maternal profile

Parameters	Number (n=200)	Percentage
Age		
<25 years	138	69
25–35 years	60	30
>35 years	2	1
Parity		
Nulliparous	133	66.5
Para 1	43	21.5
Para 2	14	7
Para 3	6	3
Para >3	4	2
Antenatal care		
Irregular	172	86
Regular	28	14
Number of seizure episode		
1–5 episodes	178	89
6–10 episodes	13	6.5
>10 episodes	9	4.5
Convulsion delivery interval		
<6 h	14	7
6–12 h	37	18.5
>12 h	149	74.5
Antihypertensive agents used		
Single antihypertensive agent	193	96.5
Multiple antihypertensive agents	7	3.5
Antiepileptic agents used		
Single antiepileptic agent	175	87.5
Multiple antiepileptic agents	25	12.5
Mode of delivery		
Vaginal delivery	113	56.5
Cesarean section	86	43
Cesarean section+hysterectomy	1	0.5
Maternal outcome		
Discharge	174	87
Death	26	13

Association was calculated convulsion delivery interval, antihypertensives, antiepileptics used, and neonatal outcome.

There was a statistically significant association between convulsion to delivery interval and the neonatal outcome ($P=0.011$), showing that the neonatal outcome is dependent on the convulsion to delivery interval (Figure 2).

Furthermore, statistically significant association was found between antiepileptic agent used and neonatal outcome ($P=0.001$), shown in Figure 3.

However, the association between antihypertensive agent used and neonatal outcome was not found to be statistically significant ($P=0.250$).

DISCUSSION

During our study period from June 2020 to June 2021, there were 9246 obstetric admissions, of which 200 patients

Table 2: Perinatal outcomes

Parameters	Number (n=200)	Percentage
Gender		
Female	96	48
Male	101	50.5
Not identifiable	3	1.5
Gestational age		
<37 weeks (preterm)	119	59.5
<34 weeks	51	25.5
34–37 weeks	68	34
37–42 weeks	81	40.5
Weight		
<1 kg	22	11
1–1.5 kg	54	27
1.5–2.5 kg	94	47
>2.5 kg	30	15
Perinatal outcome		
Live birth	151	75.5
Admission required within 7 days	116	76.8 (n=151)
No need for NICU Admission	35	23.1
Stillbirth	49	24.5

Table 3: Outcomes of live births

Parameters	Number (n=151)	Percentage
Morbidities of neonates		
Birth asphyxia	55	36.4
IUGR	46	30.4
Respiratory distress		
HMD	14	9.2
TTNB	4	2.6
MAS	12	7.9
NNHB	6	3.9
Congenital anomalies	4	2.6
LOS	2	1.3
Congenital heart disease	1	0.6
Infant of diabetic mother	1	0.6
Dehydration	1	0.6
Perinatal outcome at the 7 th postnatal day		
Total discharge	79	52.3
LAMA	4	2.6
Still in NICU care	32	21.1
Death	36	23.8

NICU: Neonatal intensive care unit, IUGR: Intrauterine growth retardation, HMD: Hyaline membrane disease, TTNB: Transient tachypnea of newborn, MAS: Meconium aspiration syndrome, NNHB: Neonatal hyperbilirubinemia, LOS: Late-onset sepsis, LAMA: Leave against medical advice

presented with antepartum eclampsia, with an incidence of 2.1%.

About 69% of women in our study were of <25 years of age which was comparable to studies conducted by Kamat and Pednecar⁵ who, found 64.1% of mothers under age of 25 years. The mean age in our study is 23.5 years which was similar to Kamat and Pednecar⁵ who had mean age of 23.74 years.

In this study, 66.5% of women were primigravida. This is comparable with other studies which showed that

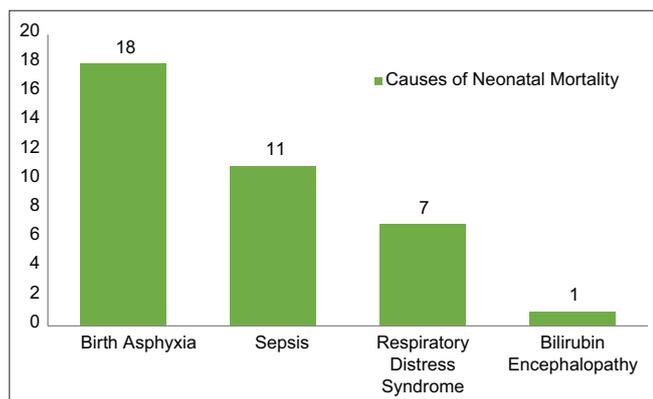


Figure 1: Causes of neonatal mortality

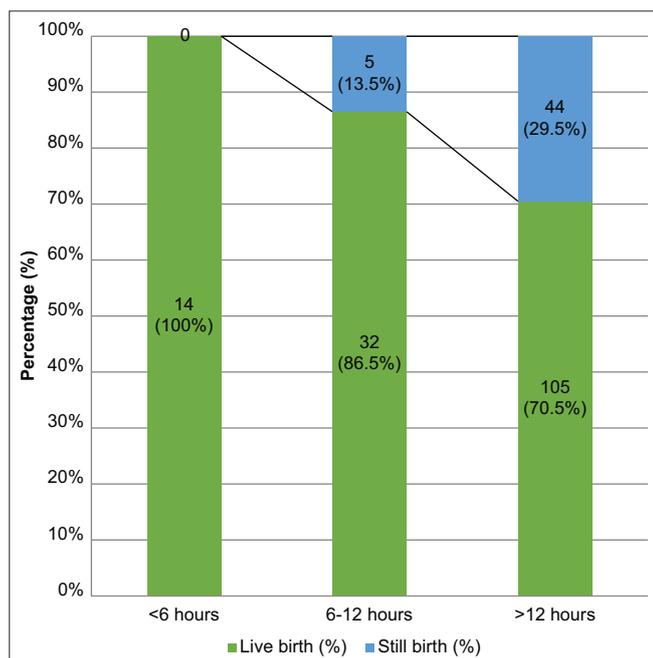


Figure 2: Association between convulsion to delivery interval and neonatal outcome

eclampsia is more likely to occur in primigravida. Alam and Akhter⁶ also showed higher prevalence of 61.3% of cases in primigravida. Similarly, Murthy et al.,⁷ showed 67% of primigravida among eclampsia cases.

In our study, 86% had no regular antenatal care similar to the study by Murthy et al.,⁷ where 86.4% of patients were not booked in antenatal period and lack adequate antenatal care. Department of obstetrics and gynecology, in our hospital, receives complicated cases from all the nearby districts, including tribal and rural areas where poor economic status, illiteracy, and distance from the health facilities might be responsible for inadequate use of antenatal care services.

All of our patients received magnesium sulfate to control seizure episodes but 12.5% of women required multiple

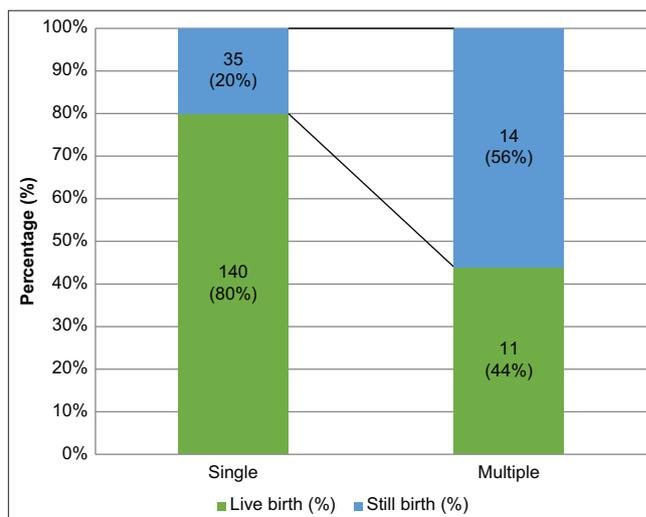


Figure 3: Association between antiepileptics used and neonatal outcome

antiepileptic agents to control these seizure episodes. It was found that women who received multiple antiepileptic agents had higher incidence of stillbirth as compared to those who had received single antiepileptic agent. The difference was statistically significant ($P=0.001$). Difficulty in controlling seizures episodes indicates the severity of disease and hence its association with poor perinatal outcome.

Only 7% of women presented within 6 h of first seizure episode. About 20% of women presented within 6–12 h of first seizure episode whereas maximum (74.5%) women presented after 12 h. The mean convulsion to delivery interval in our study was 19 h.

Being a tertiary care hospital, maximum admissions in our hospital were referrals from other centers. Delay in judgment, delay in transport, and distance hinder the timely intervention. This could be the reason for delayed presentation of women following seizure episode. This was different from the findings of Kamat and Pednecar⁵ where only a small number of patients had convulsion delivery interval of >12 h. About 73.45% of patients delivered within 10 h of seizure episode. This difference might be the result of more liberal use of cesarean section seen with Kamat and Pednecar.⁵ About 62% of patients in Kamat and Pednecar⁵ delivered through cesarean section as compared to 43% cesarean deliveries in our study.

All the 14 mothers in our study, who delivered within 6 h of seizure episode, had live births (100%). Increasing convulsion delivery interval was significantly associated with increased incidences of stillbirth ($P=0.011$). Among the 37 women who had convulsion delivery interval of

6–12 h, 13.5% of babies were stillborn, whereas incidence of stillbirths was 29.5% in 149 women with convulsion delivery interval of >12 h. Similar statistically significant relationship was found in the study conducted by Alam and Akhter⁶ where perinatal deaths among the women who delivered within 12 h after convulsion were 24.3% as compared to 54% among the women who delivered after 12 h.

Among total of 200 eclampsia cases, there were 26 maternal deaths, making a fatality rate of 13% which was lower than Shaheen et al.,⁸ who had fatality rate of 16.9%. However, fatality rates in our study were higher as compared to Sinha and Sinha⁹ who had case fatality rate of 8.3%. Higher case fatality rates seen in our study may be due to deficient antenatal care, delayed presentation, and presence of other complications of pre-eclampsia at the time of admission. Common maternal complications, which were responsible for maternal mortality, were HELLP syndrome, disseminated intravascular coagulation, acute kidney injury, pulmonary edema, and intracerebral hemorrhage.

In the present study, 56.5% were delivered vaginally whereas 43% of mothers underwent cesarean section. Vaginal delivery as preferred mode of delivery among eclampsia patients was also seen in other studies. Murthy et al.,⁷ noticed that 69.7% of eclampsia women delivered vaginally. A study by Tahmina et al.,¹⁰ showed 80% incidence of vaginal delivery among eclampsia patients. Higher rates of cesarean section in our study might be attributed to different institutional protocols regarding decision for mode of delivery and delayed presentation at the time of admission. However, in the study by Kamat and Pednecar,⁵ preferred mode of delivery was found to be cesarean section, where 62% of eclampsia women delivered by cesarean.

Hypertensive disorders are a leading cause of premature termination of pregnancy. In our study, 59.5% of babies were born prematurely whereas 40.5% were delivered at term. Among preterm deliveries, maximum babies were born between 34 and 37 weeks' gestation (34%).

The findings were comparable with Kamat and Pednecar⁵ where 55.7% of babies were delivered prematurely. Similarly, in the study conducted by Sinha and Sinha⁹ and Khuman et al.,¹¹ 63.9% and 62.6% of patients, respectively, had premature delivery.

In our study, only 15% of babies had birth weight of >2.5 kg. In a study conducted by Kamat and Pednecar,⁵ only 20% of mothers had babies with birth weight >2 kg whereas Khuman et al.,¹¹ had 30% of babies with weight

>2.5 kg. Increased incidence of preterm deliveries and fetal growth retardation commonly associated with pre-eclampsia might be responsible for these low birth weights.

In the present study, stillbirth rate was found to be 24.5% whereas there are 75.5% live births. This was comparable to the study conducted by Sujata et al.,¹² where incidence of stillbirth was 25.5%. However, studies by Khuman et al.,¹¹ and others (Kamat Pednecar⁵) showed lower rates of stillbirths. Khuman et al.,¹¹ had lower incidence of 17.2% of stillbirths. Advanced maternal complications, long seizure to delivery interval, and delayed detection of fetal distress might be responsible for these differences.

The present study showed that 76.8% of babies of total live births (n=151) required admission in NICU within 7 days of birth. The need for admission seen in our study is higher as compared to Khuman et al.,¹¹ and Sinha and Sinha⁹ were only 53.6% and 55.8%, respectively, needed NICU admissions.

Leading cause of NICU admission in our study was found to be birth asphyxia (36.5% of live births) followed by fetal growth retardation (30.4%). Other important neonatal indication for admission included respiratory distress, neonatal jaundice, congenital anomalies, late-onset sepsis, congenital heart disease, and dehydration.

Different studies have different incidence rates of complications. In the study conducted by Alam and Akhter,⁶ the most common neonatal complication (27.5%) among live born babies was neonatal jaundice whereas in the study conducted by Khuman et al.,¹¹ 55.2% of newborns in were admitted as a result of prematurity. This difference may be due to variation in admission policies, standards of care, and non-uniform criteria of diagnosis.

Higher rates of birth asphyxia seen in our study might be due to poor seizure control at immediate health centers, lack of fetal monitoring, and deficient transportation facilities.

Overall perinatal outcome was assessed at the 7th postnatal day. It was found that of total live births (n=151), 52.3% of babies were discharged and were shifted to mother side whereas 23.8% of live born babies died within 7 days of delivery. About 21.1% of babies were still admitted in NICU on the 7th postnatal day. Early neonatal deaths in our study were comparable to that of Sinha and Sinha⁹ which were 22.5% of total admitted babies died.

The most common cause of neonatal mortality in our study was found to be birth asphyxia which was

responsible for 48.6% of total deaths (n=37). It was followed by sepsis which was responsible for 29.7% of all neonatal deaths. Incidences of birth asphyxia are higher in our study as compared to Khuman et al.,¹¹ where the most common cause of neonatal death was prematurity (62.5%) followed by birth asphyxia (25%). Higher incidence of asphyxia in our cases highlights the importance of early detection of fetal distress and appropriate interventions. Timely delivery might also improve the perinatal outcome by decreasing the proportion of the babies having birth asphyxia. In Sinha and Sinha,⁹ common causes of perinatal deaths include birth asphyxia, prematurity, meconium aspiration, and neonatal sepsis. Significant numbers of early-onset neonatal sepsis emphasize the need of implementation of hygienic and aseptic practices during the delivery and neonatal care of these high-risk cases.

Perinatal mortality (stillbirth and early neonatal deaths during the first 7 days of life) in the present study was 42.5%. In the present study, 24.5% of the total babies were still born whereas 18% of total babies died within 7 days of delivery. Perinatal mortality rates are comparable with George and Jeremiah¹³ who had perinatal mortality of 41.1%. Shaheen et al.,⁸ also had similar findings where perinatal mortality of 41.6% was found. However, as compared to Murthy et al.,⁷ and Sujata et al.,¹² who had perinatal mortality of 27.5% and 28.5%, respectively, perinatal mortality in our study was higher.

One of the important concerns in the management of eclampsia is shortage of available screening test for fetal distress. Majority women who were included in our study were unbooked, most of them had not had any antenatal visit before the seizure episode. They lacked the basic antenatal care, let alone had the access to advanced investigations such color Doppler. Doppler studies of fetal and placental circulation provide important evidences regarding fetal health, granting an opportunity to improve perinatal outcome.

Higher perinatal mortality in the present study points toward the need to improve the utilization of antenatal care services, timely management of pregnancy-induced hypertension, early detection of fetal distress, prompt delivery, and appropriate resuscitation measures.

Limitations of the study

In our study, we saw the perinatal outcome restricted to the first 7 days and only short-term outcomes of eclampsia could be assessed. There is a need for further studies focusing on long-term outcomes of eclampsia and other hypertensive disorders.

Being a tertiary care center, we receive mainly complicated cases. Multicenter study done in health-care facilities providing different levels of care will be more fruitful.

CONCLUSION

Eclampsia is an enduring challenge for the whole medical community and is a reflection of illiteracy, poverty, lack of awareness, and poorly executed health-care system. Through community participation, implementation of maternal and child health-care system for adequate perinatal care, increasing awareness regarding high-risk pregnancies, and major burden of the disease can be reduced. Improvement in antenatal care is the most important approach to improve both maternal and perinatal outcomes. In conclusion, better antenatal care, prevention and early detection of hypertensive disorders of pregnancy, and early recognition of fetal distress will help reduce perinatal mortality associated with eclampsia.

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Authors Contribution:

PS- Interpreted the results; reviewed the literature; and manuscript preparation; **NM-** Concept and design of the study, prepared first draft of manuscript; **PG-** Concept, coordination, statistical analysis, and interpretation; and **SB-** Preparation of manuscript and revision of the manuscript.

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