



St. Paul's Hospital Millennium Medical College
Department of Obstetrics and Gynecology

**Adverse maternal and perinatal outcomes of Eclampsia and its
predictors among pregnant women attending at a tertiary hospital
in Ethiopia: a 3-year retrospective review**

By: Seyoum Adamt (MD, Obstetrics and Gynecology Resident)

A Thesis to be submitted to the Department of Obstetrics and
Gynecology for the Partial Fulfillment of Specialty Certificate in
Obstetrics and Gynecology; St. Paul Hospital Millennium Medical
College

Addis Ababa, Ethiopia

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Advisor: Abraham Fessehaye (MD, Associate professor of Obstetrics and Gynecology and Family planning and reproductive health subspecialist)

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DRPC FORM III: RESEARCH THESIS APPROVAL BY ADVISORS

Saint Paul's Hospital Millennium Medical College

Department of Gynecology and obstetrics, Postgraduate Program

I, Dr. Seyoum Adamt, hereby declare that this research thesis entitled “ Adverse maternal and perinatal outcomes of Eclampsia and its predictors at a tertiary hospital in Ethiopia: a 3-year retrospective study” in line with the requirement of graduate studies was fully undertaken by me under the guidance of my advisors and that I have, to the best of my knowledge and effort, avoided plagiarism or duplication of materials unless and otherwise cited and/or acknowledged and that it has not been so far submitted for any form of proposal application or consideration.

Investigator Dr. Seyoum Adamt _____

We hereby certify that I have read and evaluated this research thesis relating to“ Adverse maternal and perinatal outcomes of Eclampsia and its predictors at a tertiary hospital in Ethiopia: a 3-year retrospective study ” under my guidance from its inception up to its current format including ethical issues and that it can be submitted to the DRPC for further administrative processing & documentation of the proposal by the Department as part of the resident's research undertaking for his/ her partial fulfillment to the Degree of Specialty in Obstetrics and Gynecology.

Advisors: - Dr. Abraham Fessehaye _____

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Table of Contents

Advisor's Approval Sheet	2
Acknowledgement	3
List of Tables and Figures	6
List of Tables	6
List of figures	6
List of Abbreviations and Acronyms	7
ABSTRACT.....	8
1. Introduction.....	10
1.1 Background of the study	10
1.2 Statement of the problem	11
1.3 Significance of study	13
2. Literature review	14
2.1 Global studies	14
2.2 African studies	15
2.3 National studies	16
3. Objectives of the Study	18
3.1. General Objective	18
3.2. Specific Objectives	18
4. Methods and Materials.....	19
4.1. Study Setting	19
4.2. Study Period	19
4.3. Study Design	19
4.4. Source Population	19
4.5. Study Population	19
4.6. Eligibility criteria	19
5.6.1. Inclusion criteria	19
4.6.2. Exclusion criteria	19
4.7. Sample Size Determination and Sampling Technique	19
4.8. Study Variables	19
4.8.1 Dependent Variables	19
4.8.2 Independent Variables	19
4.9 operational definition	20

4.10. Data Collection Method, Tools and Procedures.....	20
4.11. Data Quality control	21
4.12. Data Processing and Analysis	21
4.13. Ethical Consideration	21
4.14. Plan of Dissemination of Results.....	21
5. Result	22
5.1 Sociodemographic characteristics of the study participants.....	22
5.2 Clinical characteristics during initiation of disease	22
5.3 Clinical characteristics at admission	22
5.4 Eclampsia related characteristics of the study participants	23
5.5 Labor and delivery related characteristics of the study participants	23
5.6 Maternal outcome related characteristics of the study participants.....	27
5.8 Perinatal outcome related characteristics of the study participants	27
5.7 Predictor of maternal outcome	30
5.9 Predictors of perinatal outcome.....	31
6. Discussion	32
7. Conclusion	34
8. Recommendation	35
9. References	36

List of Tables and Figures

List of Tables

Table 1. The sociodemographic Clinical characteristics of the study participants having eclampsia in SPHMMC.....	23
Table 2. Maternal and Perinatal outcome related characteristics of the study participants	28
Table 3. The bivariate and multivariate logistic regression of association between maternal outcome and its predictor among women having eclampsia and managed at SPHMMC.	30
Table 4. The bivariate and multivariate logistic regression of association between perinatal outcome and its predictor among women having eclampsia and managed at SHPMMC.	31

List of figures

Figure 1. The magnitude of maternal outcome among eclamptic mothers who managed at SPHMMC	27
Figure 2. The magnitude of perinatal outcome among eclamptic mother who managed at SPHMMC	28

List of Abbreviations and Acronyms

ANC	Antenatal care
AHR	Adjusted hazard risk
AKI	Acute kidney injury
BP	Blood pressure
CI	Confidence interval
CHR	Crude Hazard ratio
CNS	Central Nervous System
CVA	Cerebrovascular accident
DIC	Disseminated intravascular coagulation
GA	Gestational age
HELLP	Hemolysis elevated liver enzyme, low platelet
HDP	Hypertensive disorders of pregnancy
HDU	High dependency unit
IUFD	Intrauterine fetal demise
IUGR	Intrauterine growth restriction
MD	Medical doctor
MMR	Maternal mortality rate
NICU	Neonatal intensive care unit
OR	Odds ratio
PPH	Postpartum hemorrhage
RR	Relative risk
SPHMMC	Saint Paul's Hospital Millennium Medical College
SPSS	Statistical Package for Social Science
SSA	Sub-Sahara Africa
WHO	World Health Organization

ABSTRACT

Background: Eclampsia is one of the most serious obstetric emergencies and among the leading causes of maternal and perinatal mortality and morbidity. Although there were some similar studies that were previously conducted in Ethiopia little is known about the adverse maternal and perinatal outcomes of Eclampsia and its predictors in women attending at St. Paul's Hospital Millennium Medical College (SPHMMC) in Addis Ababa.

Objective: to determine the prevalence of adverse maternal and perinatal outcomes of Eclampsia and its predictors in women attending at St Paul Hospital Millennium Medical College (SPHMMC)

Methods: This was a three years (2021-2023) retrospective review of the clinical records on the adverse maternal and perinatal outcomes of Eclampsia and its predictors in women who attended at St. Paul's Hospital Millennium Medical College. A convenience sampling technique was used and all the cases with Eclampsia who fulfill the inclusion criteria were reviewed. After obtaining Ethical clearance from Ethical Review Board of SPHMMC Data were collected retrospectively with electronic capture technique using Kobo tool box. Data were analyzed using SPSS version 27. Simple descriptive statistics, Chi-Squared test, and multiple logistic regression analysis were performed as appropriate. Odds ratio with 95% CI and P-value of <0.05 was used to present findings significance.

Result: - Among the study participants, 68.6% of women experienced poor composite maternal outcomes. The most common maternal complications were HELLP or partial HELLP syndrome (51%), acute kidney injury (35.4%), severe persistent hypertension (25%), and placental abruption (19.8%). About 10 mothers (7.14%) require ICU admission, and there were 02 maternal deaths making the case fatality rate 1.43%. Lack of antenatal care (ANC) follow-up (AOR = 2.1, 95% CI: 1.24–6.42) and treatment delay ≥ 6 hours from seizure onset (AOR = 11.3, 95% CI: 1.35–95.32) were significant predictors of adverse maternal outcomes. Poor perinatal outcomes occurred in 45.7 % of neonates, with prematurity, low birth weight, and NICU admission being the most frequent ones. There were 33.5% (17 still birth and 32 early neonatal deaths) perinatal deaths making the overall Perinatal mortality rate 335 out of 1000 live births. Lack of ANC (AOR = 5.6, 95% CI: 1.69–18.59) and severe maternal hypertension (AOR = 5.7, 95% CI: 1.70–46.39) were independently associated with adverse perinatal outcomes.

Conclusion: - The study revealed a high burden of adverse maternal and perinatal outcomes among the participants. More than two third of women experience Eclampsia associated adverse outcomes and Perinatal outcomes were also concerning, with nearly half of neonates experiencing poor outcomes, predominantly prematurity, low birth weight, NICU admission, and early neonatal death. Key factors associated with adverse maternal and perinatal outcomes were lack of ANC follow-up, treatment delay ≥ 6 hours from seizure onset, and severe maternal hypertension.

- Finally we recommend Promotion of early and regular ANC attendance to identify and manage high-risk pregnancies.
- Strengthening primary health care set ups for early recognition and timely pre-referral management of obstetric emergencies like Eclampsia.

Keywords; Eclampsia, Maternal Outcome, Perinatal Outcome, St Paul's Hospital Millennium Medical College

1. Introduction

1.1 Background of the study

Eclampsia is one of the serious obstetric emergencies, and it is defined as the new onset of seizure and/or coma unexplained by other causes or disorders during pregnancy or postpartum in a woman with signs or symptoms of preeclampsia or gestational hypertension. (1,2)

The exact pathogenesis of Eclampsia is not clearly stated but the possible risk factors are null parity, maternal age <20 years and >40 years, multiple gestation, preeclampsia/Eclampsia in previous pregnancy, chronic hypertension or renal disease, diabetes mellitus, obesity, anti-phospholipid syndrome, and family history. Eclampsia is characterized by high blood pressure, headaches, blurring of vision and convulsions, and in preeclampsia, the mother's high blood pressure reduces the blood supply to the fetus, which may get less oxygen and fewer nutrients. Eclampsia is mostly diagnosed with early detection of preeclampsia because there are no reliable clinical symptoms or laboratory tests for the prediction of its development. Hypertension is regarded as a defining symptom of Eclampsia when making a diagnosis. Preeclampsia, on the other hand, typically has an insidious beginning, with symptoms typically appearing in the latter stages of the condition, whereas pathological abnormalities are visible (3)

In nearly 16% of the Eclampsia cases, hypertension may not be reported at all. It has been reported that proteinuria might be absent in nearly 14% of the Eclampsia cases and substantial proteinuria might be present in nearly half of the cases.(4)

The easy availability and accessibility of healthcare facilities and centers to nearly all pregnant women can help in the timely detection and prevention of Eclampsia and further maternal and perinatal mortality and morbidity in the affected subjects, which has been linked to a decrease in the incidence of Eclampsia in developed countries.(5)Current strategies for prevention of Eclampsia can be broadly classified as antenatal surveillance, modification of lifestyle ,nutritional supplementation, and pharmacological therapy.

Although termination of pregnancy is the only definitive treatment, the standard care for women with Eclampsia is to use an anticonvulsant to control the immediate seizure and prevent recurrent episodes. The preferred anticonvulsant is magnesium sulphate (MgSO_4).(6) Antihypertensive drugs are mandatory for very high blood pressure ($\text{BP} \geq 160/110$ mm Hg).

Maternal complications of Eclampsia include placental abruption, pulmonary edema, HELLP syndrome, DIC, stroke, recurrent seizure, renal damage, aspiration pneumonia, and maternal death.(7)

1.2 Statement of the problem

Globally, hypertensive disorders of pregnancy complicate 3–10% of all pregnancies and it is major cause of maternal and perinatal complications.(8) In 2017 nearly 295,000 women died during pregnancy and childbirth, according to WHO report on maternal mortality trends .(9, 10) By far most of these deaths (99%) occurred in low and middle income countries, and most could have been prevented.

In 2020, the MMR in the African Region was 531 deaths per 100 000 live births which is 69% of global maternal deaths in 2020. About 196000 (66%) of maternal deaths were from SSA. Hypertensive disorders of pregnancy were responsible for 22.1% of the deaths and the major complications which account for almost 75% of all maternal deaths, are severe hemorrhage, infection, high blood pressure during pregnancy (pre-Eclampsia/ Eclampsia), and complications related with unsafe abortion (11)

Likewise, as the 2019 WHO maternal mortality fact sheet reported, around 810 women die every day from pregnancy-related complications and Hypertensive Disorders of Pregnancy is one of the three deadly triads contributing for the maternal mortality. According to the World Health Organization (WHO), secondary analysis of multi-country survey on maternal and newborn health, incidences of preeclampsia and Eclampsia cases were 2.16% and 0.28%, respectively. Maternal near miss cases were eight times more frequent in women with preeclampsia, and this can be increased by far up to 60- fold higher frequency in women with Eclampsia. (10)Eclampsia also increases the risk of maternal death, both in developed (0.5–1.8 %) and developing countries (15 %) (12)

Hypertensive disorders of pregnancy accounts for 18% of maternal deaths worldwide, with an estimated number of about 62000–77 000 deaths occurring each year .About 16% of these deaths are attributable to Eclampsia /pre-Eclampsia.(13,14)

In Africa and Asia, nearly 10 % of all maternal deaths are associated with hypertensive disorders of pregnancy, while one-quarter of maternal deaths in Latin America have been associated with preeclampsia/Eclampsia complications (10).

A recent review reported that hypertensive disorders of pregnancy complicate around 6% of all pregnancies in Ethiopia.(15)A study done at JUMC(Jimma university medical center) in 2011 showed that preeclampsia with severity feature is the most common HDP attributed for about 51.9% of cases while the proportion of Eclampsia being 23.4%(16) A one year review which was done in 2017 at SPHMMC by Thomas et al showed that Eclampsia complicates 82 cases out of 10000 deliveries with a case fatality rate of 01 in 13 cases.(17) This study was a prevalence study and it doesn't clearly specify the rate of adverse maternal and perinatal outcomes associated with Eclampsia and outcome predictors.

A one-year prospective study of Eclampsia at Karamara Regional Hospital, Eastern Ethiopia by Wondimu et al in 2018 showed that Eclampsia complicates 2.7% (93 in 3500 deliveries) of the cases and the maternal and perinatal case fatality rates were 11% and 34.7% respectively.(18)Disease burden due to preeclampsia/Eclampsia and the Ethiopian health system's response showed preeclampsia/Eclampsia complicated 1.2% of all institutional deliveries.(12)

Preeclampsia and Eclampsia were reported to account for 19 % of maternal and 25 % of perinatal mortality in Ethiopia (15,19)

Perinatal mortality is three to five folds higher in women with preeclampsia/Eclampsia syndrome as compared to those without the disorders (8,10) Different studies documented high perinatal mortality rate among women with hypertensive disorders of pregnancy. For instance, the rate of perinatal death was found to be 317/1000 births in Ethiopia (16); A Southern Ethiopia study reported a considerable association of perinatal death with maternal death, antepartum occurrence of the disease, low birth weight, hepatic injury, earlier gestational age at diagnosis, and being multipara (13)

Although our center, SPHMMC is one of the largest referral hospitals in Ethiopia, with one of the highest annual deliveries including cases complicated by Eclampsia /preeclampsia, little is known regarding the adverse maternal and perinatal outcome of Eclampsia and its predictors at this hospital. The aim of this study will be to fill this gap by determining the rate of adverse maternal and perinatal outcome of Eclampsia and its predictors.

1.3 Significance of study

St. Paul's hospital is one of the biggest national referral hospitals with high annual deliveries including cases complicated by Eclampsia. In addition, the hospital has the most advanced and the biggest MFM unit which deals with management of complicated cases including preeclampsia/Eclampsia. Hence, understanding or determining the rate of maternal and perinatal outcomes of Eclampsia and its predictors is essential. There was one study done on Eclampsia at SPHMMC in 2017(17), but this study was a prevalence study and it doesn't specifically address the rate of adverse maternal and perinatal outcomes associated with Eclampsia and outcome predictor factors. So our study aims to bridge this gap. Findings/results of our study will also be helpful in improving the quality of care for Eclampsia cases by identifying predictors of adverse outcomes. Further, the evidence generated from our study will boost existing inadequate literature on the subject matter in an Ethiopian context. At international level, being conducted in a sub-Saharan setting, the evidence will have relevance of practice improvement in other settings within the Sub-Saharan setting.

2. Literature review

2.1 Global studies

A 2015 global study conducted by WHO on maternal and newborn health showed that Eclampsia/preeclampsia accounts for about 1 in 7 maternal deaths, with most resulting from Eclampsia. In sub-Saharan Africa, 1 of every 1,500 pregnancies ends in a maternal death attributable to Eclampsia/preeclampsia; in South Asia the proportion is about 01 in 3,000. According to this multi-country study conducted in Argentina, Egypt, India, Peru, South Africa, and Vietnam, which included about 8,000 pregnancies enrolled during antenatal care Eclampsia/preeclampsia was the primary obstetrical cause for 1 of 4 perinatal deaths, with similar proportions affected for stillbirths and early newborn deaths.(20)

A 01 year retrospective study in India in January 2014 which includes about 52 study subjects with Eclampsia showed that thirty-one patients (59.6%) required mechanical ventilator support. Twenty-five (48.07%) patients were delivered by emergency cesarean section and 30(57.6%) babies were low birth weight and there were 11(21.1%) stillbirths. There was one maternal death and 6(11.5%) patients had neurological impairment. Maternal mortality was significantly associated with number of seizure episodes and time interval between seizure onset and administration of magnesium sulphate.(21)

Another 06 month retrospective cross sectional study done in India from August, 2019 to January, 2020 on 25 study subjects with Eclampsia from 4712 deliveries showed that Preterm delivery complicates 54% of the cases and 92% newborns had birth weight of less than 2500 gm. There were 8.69% intra uterine deaths and 17.39 % end up with still birth. Caesarean delivery was the commonest mode of delivery in 96% of patients with eclampsia.(22)

A 5 year facility based study in China in 2016 involving 6,970,032 deliveries with 66,494 stillbirths showed that stillbirth rate in women with hypertensive disorder in pregnancy was 21.9 per 1000 births. The risk was higher in those who had received few antenatal care visits or who were poorly educated.

Another 9-year national hospital-based cohort study in China from 2012-2020 on characteristics and fetal outcomes of pregnant women with hypertensive disorders including Eclampsia showed that more severe Blood Pressure level at admission to labor and delivery unit was associated with increased adverse perinatal outcomes.

A 2 year retrospective cohort study which was conducted in Bahrain in December 2019 on 142 study subjects with preeclampsia/eclampsia showed that abruption placentae complicates 3.5% of cases, HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet count) develops in 3.5% of cases, and 2.8% of patients had ICU admission. Other maternal complications included acute renal failure (ARF) in 1.4% of the cases; pulmonary edema and peripartum cardiomyopathy in 1.4% of the patients. Preterm delivery rate was 16.3% and intrauterine growth restriction complicates 13.5% of the cases and it was significantly higher in patients who presented between 30 and 34 week of gestation ($P < 0.001$)(25)

2.2 African studies

A 01 year retrospective descriptive cohort study carried out at Mpilo Central Hospital, a tertiary teaching referral government hospital in Bulawayo, Zimbabwe which includes 121 study subjects from 9086 deliveries in 2016 showed that the most common complication was HELLP syndrome (9.1%). Maternal mortality was 1.7% and 49.6% of the babies were lost through stillbirths and early neonatal deaths.(26)

A prospective cross sectional study done at Amino kano teaching hospital of Nigeria in 2012 which constitute 120 study subjects with Eclampsia showed that about 39.2% of the cases developed complication. 11.7 % of women dead mainly from CVA and pulmonary edema. Acute renal failure complicates 5% of the cases, HELLP Syndrome 4.2% of cases, and Pulmonary edema/pneumonia 5% of the cases. Coagulopathy developed in 3.4% of the cases, Abruptio placenta complicates 2.5% and about 1.7% of women had Cortical blindness. The stillbirth rate was 22.5% and 25.8% of babies had birth weight less than 2500gm, 7.5% of them were preterm, 39.1% had low Apgar scores at 5 minutes and 14.2% were admitted to the special care baby unit, mostly for asphyxia and prematurity.(27)

Another retrospective review of 761 women with eclampsia in a tertiary institution in Nigeria from 2005-2020 showed that maternal death complicates 7.6% of the cases. Aspiration pneumonitis or pulmonary edema (34.5%), cerebro-vascular accident (25.9%), hemorrhage (17.2%) and acute renal failure (12.1%) were the major causes of death. Being delivered by caesarean section, booking status, onset of seizure to admission time of greater than or equals to 10 hours and coma of five hours or more were found to be independently associated with maternal death.(28)

A 02 year retrospective cohort study done in Kenya in 2017 on 620 study subjects with preeclampsia/eclampsia out of 1529 deliveries showed that Women with early onset of the disease(before 34 weeks of gestation) had greater adverse maternal and perinatal outcomes including HELLP syndrome, renal dysfunction, stillbirth, and neonatal death. Early onset preeclampsia/eclampsia was also associated with higher odds of prolonged maternal hospitalization, beyond seven days, and antepartum hemorrhage. Neonates born after early onset of pre-eclampsia/eclampsia had increased risk of respiratory distress and birth asphyxia.(29)

Another hospital based longitudinal case series study done in Kenya in 2020 showed that perinatal mortality was reported in 9.4% of women with eclampsia. Parity was statistically associated with an increased odds of adverse perinatal outcomes and caesarean delivery. In addition, induction of labor decreased the risk of adverse outcomes.(30)

2.3 National studies

A 07 month prospective cohort study which was conducted on 217 women with eclampsia in selected tertiary hospitals of Ethiopia in 2017 showed that 80.2% of cases developed maternal complications. The most commonly occurring complications were aspiration pneumonia (22.9%), severe anemia (18.4%), coexistence of aspiration pneumonia and HELLP syndromes (16.1%), puerperal sepsis (13.2%), and AKI (6.9%). The overall incidence rate of the maternal complication was 9.01 per 1000 person years (with 95%CI of 7.76–10.45), while nine women died with a case fatality rate of 4.2%. lack of antenatal care follow-up, maternal leukocytosis and elevated serum Creatinine levels were revealed as independent determinants of maternal complications .But being in the age group of 20–34 years was about 40% less likely to develop maternal complications compared to women aged at least 35 years.(31)

A retrospective cohort study conducted between 2008 and 2013 in three university teaching hospitals of southern Ethiopia among 1015 women admitted with a diagnosis of HDP showed that there was 5% maternal death the majority of which were due to eclampsia.

In this study maternal death was strongly associated with grand multiparity, lack of ANC follow up, intrapartum and postpartum onset of the disease, ever highest systolic blood pressure (BP)<140 mmHg, and ever highest diastolic BP<90 mmHg in the current illness. There was also a statistically significant association between maternal death and hemoglobin <12 gm/dl, platelet

count<100,000/mm³, Creatinine $\geq$ 1mg/dl, and SGOT $\geq$ 2-fold rose. Proteinuria was not associated with maternal death.(32)

A meta analytic study and systematic review done in 2019 in Gonder ,Northwest Ethiopia which included thirteen studies with an overall sample size of 5894 women diagnosed to have hypertensive disorder of pregnancy showed that maternal death complicates 4% of the cases (95% CI: 2,6%). The pooled prevalence of HELLP syndrome was 13% (95% CI: 10, 16%). Other complications such as pulmonary edema, kidney injury, hepatic injury, placental abruption, and aspiration pneumonia were also reported. Perinatal death complicates one-fourth of pregnancies (95% CI: 18, 32%) and the pooled prevalence of low birth weight was 37% (95% CI, 27, 48%). (13)

Another institutional-based retrospective chart review which was conducted at Gondar University Specialized Hospital from March to June 2021 on 311 study subjects showed that eclampsia complicates 18.65% of the cases and unfavorable maternal outcomes presented in more than 25 % of cases. In those women with eclampsia the observed complications were pulmonary edema (3.9 %), aspiration pneumonia (42.9 %), AKI (4.2 %), HELLP syndrome (35.1 %), PPH (3.9 %), psychotic disorder (2.5 %), uterine rupture (2.5 %), and surgical site infection (10.4 %). A result of this study showed 31 (10 %), 24 (8.6 %), and 7 (2.5%) of deliveries were complicated by stillbirth, NICU admission, and neonatal death respectively. Women with epigastric pain and blurring of vision were observed to have more frequent unfavorable maternal outcomes. The majority of patients with two times elevated aspartate transaminase and platelet count <100,000 had unfavorable maternal outcomes. In cases where antihypertensive drugs were used, 31.1 % had an unfavorable outcome, and the higher occurrence of an unfavorable maternal outcome was reported among 16 of mothers whose creatinine value was greater than 1.1 mg/dl.(33)

A 06 month prospective observational study in Eastern Ethiopia in 2022 which includes 245 deliveries complicated with eclampsia showed that perinatal mortality was 26.1 % and about 57.4 % of newborns developed neonatal complications. Fifth-minute Apgar score was statistically a determinant to perinatal mortality whereas maternal parity, maternal complications and fifth-minute Apgar score were found to be determinants for neonatal complications.(34)

3. Objectives of the Study

3.1. General Objective

To determine the prevalence of adverse maternal and perinatal outcomes of Eclampsia and its predictors in women who attended at St Paul's Millennium Medical College in Addis Ababa, Ethiopia from 2021-2023

3.2. Specific Objectives

To determine adverse maternal outcomes and its predictors

To determine adverse perinatal outcomes and its predictors

4. Methods and Materials

4.1. Study Setting

The study was conducted in SPHMMC. Saint Paul's Hospital Millennium Medical College is a specialized teaching hospital in the north-western part of Addis Ababa, the capital city of Ethiopia. Its OBGYN department has one of the largest MFM units in the country with fully equipped staffs.

4.2. Study Period

The study was conducted in Obstetrics and Gynecology Department of St. Paul's Hospital Millennium Medical College over a period of 3 years (January 1st 2021---December 30th 2023)

4.3. Study Design

An institution-based retrospective chart review was conducted

4.4. Source Population

All pregnant women who delivered at SPHMMC in the study period

4.5. Study Population

All pregnant women who delivered in SPHMMC during the study period and diagnosed to have Eclampsia that fulfill the inclusion criteria were the study population.

4.6. Eligibility criteria

5.6.1. Inclusion criteria

Delivery at SPHMMC from January 1st 2021 to December 30th 2023 and diagnosed to have Eclampsia

4.6.2. Exclusion criteria

Mothers with medical records that have incomplete data

Mothers with lethal fetal congenital anomalies

4.7. Sample Size Determination and Sampling Techniques

We employed convenient sample size calculation technique in which consecutive cases that fulfilled the inclusion and exclusion criteria were included in the study period.

4.8. Study Variables

4.8.1 Dependent Variables

Maternal outcomes

Perinatal outcomes

4.8.2 Independent Variables

Maternal blood pressure at referral

Admission Blood Pressure

Maternal comorbidities

ANC follow up

Number of convulsion/s

Interval from 1st convulsion to treatment initiation

Interval from 1st convulsion to delivery

Pre-referral management

Gestational Age at the time of delivery

Laboratory abnormalities

4.9 operational definition

Eclampsia- new onset of convulsion or coma in a pregnant patient with or without pre-Eclampsia which is not attributable to any other causes

Maternal outcome-refers mothers who had at least one of the following complications related with Eclampsia (abruption of placenta, HELLP syndrome, DIC, AKI, stroke, aspiration pneumonia, pulmonary edema, maternal death, PPH)

Perinatal outcome-refers to fetal/newborns who had at least one of the following complications associated with Eclampsia (abortion, IUGR, IUFD, low birth weight, pre term birth, 5-minute Apgar score<5)

4.10. Data Collection Method, Tools and Procedures

The entire three-year patients' data were collected for all age categories. Data extraction format having the specified data variables were used to collect necessary data from HMIS register, patient folder, and HDU and ICU log books. The data extraction format was adapted from previous similar studies, and it primarily contains sections on sociodemographic characteristics, clinical profiles and laboratory parameters. Data collectors familiar with the study setting (02 Midwives and 01 General medical practitioner) were recruited and briefly trained as data collectors while principal investigator supervised the data collection process. Data was collected with an electronic data collection method which is kobo collect. Data were first cleaned manually and data extraction format that did not fulfill minimum criteria for completeness was rejected from entry. A structured data extraction questionnaire was used and pre-test was conducted in Ras desta hospital with 5% of the sample size.

4.11. Data Quality control

An English version data extraction format was used to collect data. Brief training for the data collectors (three health professionals) about the process of data collection was given before the process of data collection. Close supervision was maintained during data collection by the principal investigator and the filled electronic format was double-checked daily for consistency and completeness by data collectors and principal investigator before analysis

4.12. Data Processing and Analysis

The data collected using kobo tools were checked for its completeness and then it is exported to SPSS version 27 for analysis. Simple descriptive statistics was used to analyze the sociodemographic and obstetric characteristics. Bivariate and multiple logistic regression analysis were performed to determine predictors of adverse maternal and perinatal outcomes of Eclampsia. Odds ration with 95% CI and P-value of <0.05 was used to present findings significance

4.13. Ethical Consideration

The study was conducted after obtaining Ethical clearance from Ethical Review Board of St. Paul's Hospital Millennium Medical College. The department of Obstetrics and Gynecology was briefed on the purpose and importance of the study. As the data used for this study was secondary in nature, no need to have written informed consent from the patients. After data collection, data was stored and used confidentially only for study purposes.

4.14. Plan of Dissemination of Results

The study is completed and key conclusions and recommendations have been drawn. The research findings will be submitted to the gynecology and obstetrics department and will be presented at scientific conferences and professional organization meetings, including the annual meetings of the Ethiopian Society of Obstetricians and Gynecologists, the Ethiopian Public Health Association, the Ethiopian Medical Association, and etc. The findings will be published in a peer-reviewed journal and made available online. The information will also be utilized as a starting point for future research and treatments.

5. Result

There were about 30,000 total deliveries in the study period and 150 mothers were diagnosed to have Eclampsia, making the magnitude of Eclampsia 5 cases per 1000 deliveries (95% CI: 4.72, 6.10). This prevalence is lower than that of the previous study in the same setting in 2017 which showed prevalence of Eclampsia being 84/10,000 deliveries.(17) This variation may be due to differences in the sample size and study time. Out of 150 patients with Eclampsia, 10 were excluded from the study due to missed data and lost charts, leaving 140 patients for analysis

5.1 Sociodemographic characteristics of the study participants

The majority of the study participants were between 20 and 34 years of age (78.6%), while 9.3% were below 20 years and 12.1% were 35 years or older, with a mean age of 25.16 years. More than half of the women were primigravida (56.4%), followed by multigravida (27.1%), and large proportion of patients (95.7%) were referred from other health facilities, with most referrals coming from health centers (79.1%), followed by primary or general hospitals (19.4%), and a small number from private health care settings (1.5%). Regarding antenatal care (ANC), 59.3% of the women had attended ANC visits. Among those who attended ANC, 62.7% had fewer than eight visits. Nearly all pregnancies were singleton (95.7%), with only 4.3% being multiple gestations.

5.2 Clinical characteristics during initiation of disease

More than half of the women (53.6%) had moderately elevated blood pressure (140/90–159/109 mmHg) at the time of referral. The majority (90.7%) had received treatment prior to referral, and magnesium sulfate was the main medication (100%) given for patients at the referring health care facility. Ten percent of the women had a preexisting medical condition, most commonly chronic hypertension (85.7%). Additionally, 6.4% of the women had a previous history of Eclampsia.

5.3 Clinical characteristics at admission

At admission, nearly half of the women (46.4%) presented with severe hypertension ($\geq 160/110$ mmHg). Thirty three percent had an elevated pulse rate (>100 bpm). The majority (92.9%) had a respiratory rate below 24 breaths per minute, and 40% had oxygen saturation <90 . Regarding seizure timing, 65% of the women experienced seizures antepartum, while 15.7% occurred

within 48 hours postpartum. The interval from seizure onset to delivery exceeded 12 hours in most cases (72.9%), and more than half (52.9%) received treatment six or more hours after seizure onset. Most seizures (79.3%) occurred at home, with smaller proportions occurring at referral facilities (8.6%) and hospital wards (9.3%).

5.4 Eclampsia related characteristics of the study participants

At presentation, most women (75.7%) reported signs and symptoms, the most common being headache (97.2%), followed by visual disturbances (83.9%) and right upper quadrant pain (30.2%). All patients (100%) received magnesium sulfate, while nearly half were given hydralazine (46.4%), methyldopa (51.4%), and nifedipine (30.7%); antibiotics were administered to 86.4% of cases. The majority (70.7%) experienced four or fewer convulsions before stabilization. Upon arrival, most had a Glasgow Coma Scale (GCS) score of 13–15 (75%), while 10.7% presented with a severe reduction in consciousness ($GCS \leq 8$). Almost all women (97.9%) required High Dependency Unit admission, with 58.4% staying 48 hours or less. Additionally, 7.2 % of patients required Intensive Care Unit admission and about 10% of them require support with mechanical ventilation.

5.5 Labor and delivery related characteristics of the study participants

Regarding the mode of delivery, the majority of women (60.7%) delivered by cesarean section (CS), while 33.6% had a spontaneous vaginal delivery. Among those who delivered by cesarean section (n=85), the leading indications were non-reassuring fetal heart rate (NRFHR) (25.9%), failed induction (18.8%), and malpresentation (18.8%). Other reported indications included unfavorable Bishop Score (11.8%), previous CS scar (7.1%), meconium-stained amniotic fluid (5.9%), twin pregnancy (5.9%).

Table 1. The sociodemographic and clinical characteristics of the study participants having eclampsia in SPHMMC.

Sociodemographic characteristics		
Variable	frequency	Percent
Age in years		
<20	13	9.3
20-34	110	78.6
≥35	17	12.1
Gravidity/parity		

Primigravida	79	56.4
Parous	23	16.4
Multigravida	38	27.1
Patient referred?		
Yes	134	95.7
no	6	4.3
Place of referral (n=134)		
Health center	106	79.1
Primary/general hospital	26	19.4
Private health center	2	1.5
ANC		
yes	83	59.3
no	57	40.7
Number of ANC (=83)		
<8	52	62.7
≥8	31	37.3
Number of gestations		
Singleton	134	95.7
Multiple gestation	6	4.3
Clinical characteristics during initiation of disease		
Variable	Frequency	Percent
Blood pressure at referral		
<140/90	19	13.6
140/90-159/109	75	53.6
≥160/110	46	32.9
Received treatment at referral		
Yes	127	90.7
no	13	9.3
Types of treatment		
Mgso4	127	100
diazepam	5	3.9
hydralazine	10	7.9
nifedipine	6	4.7
methyldopa	7	5.5
antibiotic	33	25.9
Preexisting medical condition		
Yes	14	10
no	126	90
Types of preexisting medical condition		
Chronic hypertension	12	85.7
Kidney disease	2	14.3
History of Eclampsia?		
Yes	9	6.4
no	131	93.6

Clinical characteristics at admission		
Variable	Frequency	Percent
Blood pressure at admission		
<140/90	19	13.6
140/90-159/109	56	40
≥160/110	65	46.4
Pulse rate		
60-100	94	97.1
>100	46	32.9
RR		
≤24	130	92.9
≥25	10	7.1
Maternal oxygen saturation		
<90	42	30
≥90	98	60
Timing of seizure onset		
antepartum	91	65.0
intrapartum	11	7.9
post-partum within 48 hours	22	15.7
before 20 weeks/after 48-hour post-partum	16	11.4
Interval from seizure onset to delivery in hours		
≤6	9	6.4
7-12	29	20.7
>12	102	72.9
Interval from seizure onset to treatment initiation in hours		
≤1	20	14.3
2-6	46	32.9
≥6	74	52.9
Place of first seizure episode		
home	111	79.3
Referral	12	8.6
EGOPD	4	2.9
Ward (MW/LW)	13	9.3
Eclampsia related factors		
variable	frequency	Percent
Sign symptoms at presentation		
Yes	106	75.7
no	34	24.3
Types of symptoms		
headache	103	97.2
Visual disturbance	89	83.9
RUQ pain	32	30.2
Shortness of birth	13	12.6
Chest pain	1	0.9

Cough	4	3.8
Loss of consciousness	2	1.9
Yellow discoloration	1	0.9
Types of treatment initiated		
Mgso4	140	100
diazepam	0	0
hydralazine	65	46.4
nifedipine	43	30.7
methyldopa	72	51.4
antibiotic	121	86.4
Number of convulsions		
≤4	99	70.7
>4	41	29.3
GCS at arrival		
13-15	105	75
9-12	20	14.3
≤8	15	10.7
Need for HDU admission		
Yes	137	97.9
no	3	2.1
Duration of HDU in hour		
≤48	80	58.4
>48	57	41.6
Need for ICU admission		
Yes	10	7.2
no	130	92.8
Need for maternal mechanical ventilation		
Yes	14	10
no	126	90
Labor and Delivery related factors		
Variable	frequency	Percent
Mode of delivery		
SVD	47	33.6
CD	85	60.7
Medical termination	6	4.3
Hysterotomy	2	1.4
Indication for Cesarean delivery		
Contracted pelvis	1	1.2
Failed induction	16	18.8
Malpresentation	16	18.8
MSAF	5	5.9
NRBPP	2	2.4
NRFHR	22	25.9
Obstructed labor	1	1.2
Placenta previa	1	1.2

Previous cesarean scar	6	7.1
Twin pregnancy	5	5.9
Unfavorable bishop score	10	11.8

5.6 Maternal outcome related characteristics of the study participants

The majority of women (68.6%) experienced poor composite maternal outcomes. Among these, the most common complications were HELLP or partial HELLP syndrome (51%), acute kidney injury (35.4%), severe persistent hypertension (25%), and placental abruption (19.8%). About 10 mothers (7.1%) require ICU admission. There were 02 maternal deaths associated with Eclampsia in the study period making the case fatality rate 1.43 %. Regarding laboratory and hospitalization data, 24.3% of women had a white blood cell count $\geq 15,000/\text{mm}^3$, and most patients (80.7%) had a hospital stay of 3–7 days, while 19.3% stayed longer than 7 days

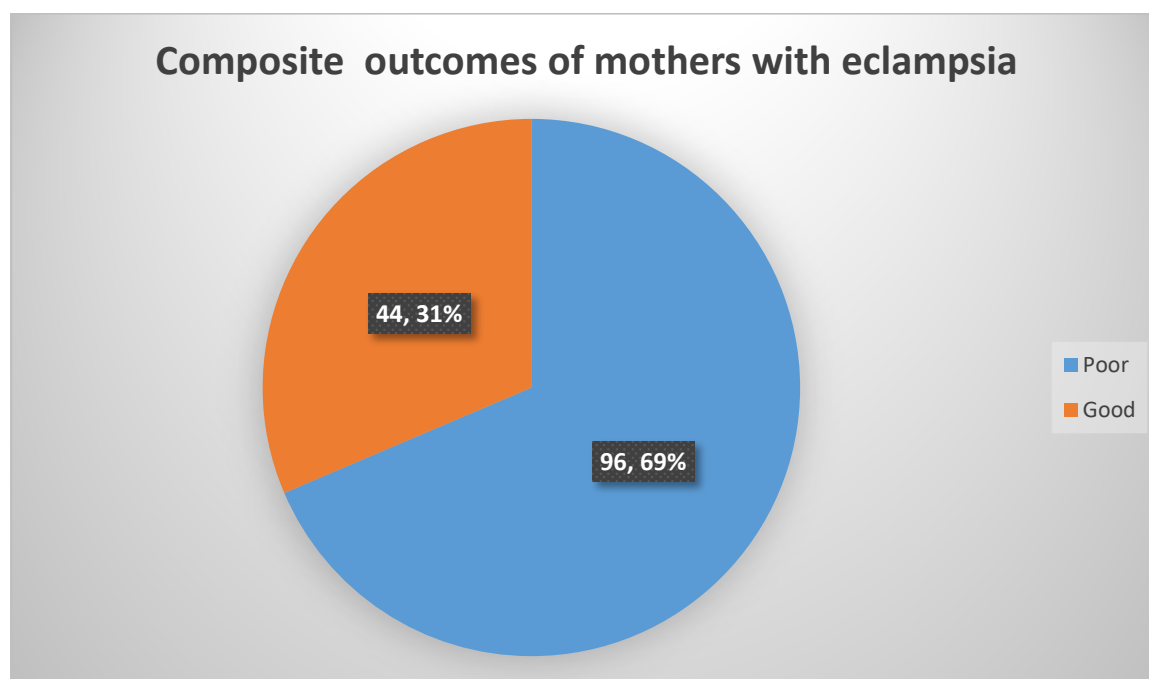


Figure 1. The magnitude of maternal outcome among eclamptic mothers managed at SPHMMC

5.8 Perinatal outcome related characteristics of the study participants

Nearly half of the deliveries (45.7%) occurred at term (≥ 37 weeks), with 25% between 28 to 33+6 weeks. Regarding the perinatal outcomes, there were 6 set of twin pregnancies, 121 live

births, 32 early neonatal deaths, 8 abortions, and 17 stillbirths making the overall PNMR 336 per 1000 live births. About 44.3% (N=62) of new borns had normal birth weight (≥ 2500 gram), 45.7% (N=64) s had Low birth weight (1000-2499 grams) and about 10% (N=14) had birth weight < 1000 grams. The mean birth weight was 2194.64 gram. Out of those live births about 32.1% (N=45) require NICU admission. Prematurity and low birth weight were the most common indications for admission to the NICU and about 10 new borns had perinatal asphyxia Nearly half (N=64, 45.7%) developed perinatal complications, most commonly early neonatal death (50%), intrauterine growth restriction (31.3%), and stillbirth (26.6%).

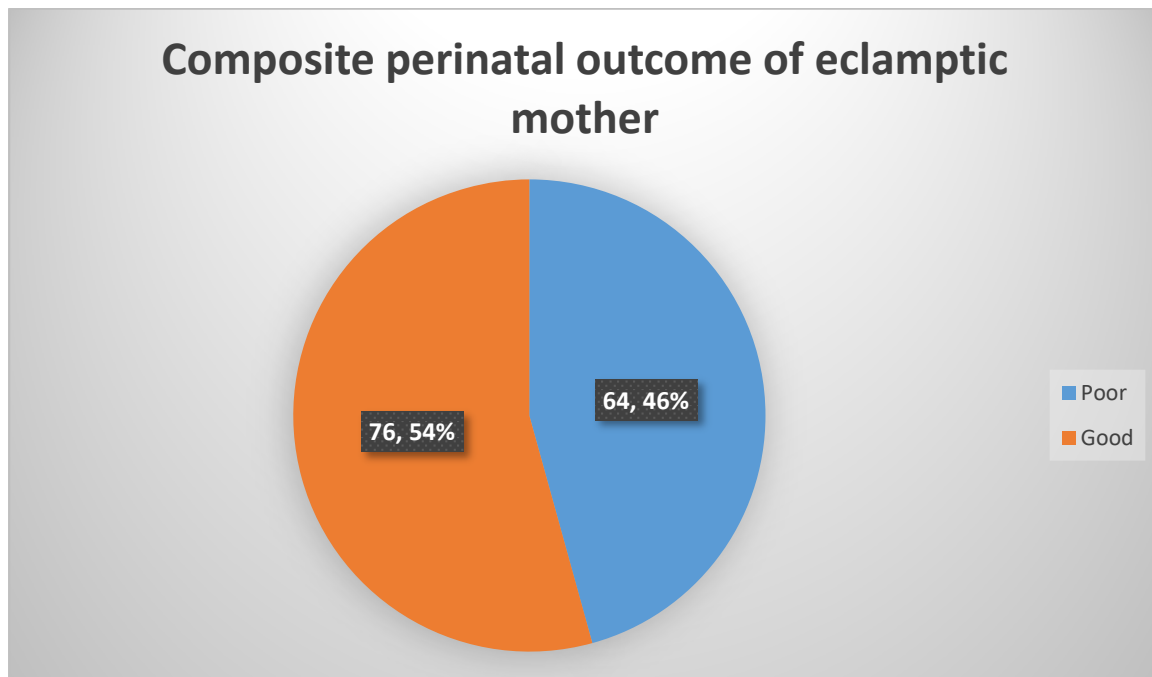


Figure 2. The magnitude of perinatal outcome among eclamptic mother who managed at SPMMC

Table 2. Maternal and Perinatal outcome related characteristics of the study participants

Variable	frequency	Percent
Composite maternal outcome		
Poor	96	68.6
Good	44	31.4
List of maternal complication (n=96)		
HELLP or partial HELLP	47	51
Pulmonary edema	10	7.1
abruption	19	19.8
AKI	34	35.4

Cerebral hemorrhage stroke	11	11.5
DIC	8	8.3
Severe persistent HTN	24	25
Convulsion after loading with mgso4	26	27.1
Admission to ICU	10	7.1
Death	2	2.1
Jugular vein thrombosis	1	1.1
Postpartum psychosis	1	1.1
VVF	1	1.1
WBC		
<15000	106	75.7
≥15000	34	24.3
Length of hospital stay in days		
3-7	113	80.7
>7	27	19.3
Perinatal outcome characteristics		
Variable	frequency	Percent
Composite perinatal Outcome		
poor	64	45.7
good	76	54.3
Gestational age in weeks		
<28	8	5.7
28-33 ⁺⁶	35	25.0
34-36 ⁺⁶	33	23.6
≥37	64	45.7
Birth weight		
≤1000	14	10.0
1000-1500	22	15.7
1500-2499	42	30.0
≥2500	62	44.3
Five-minute APGAR		
0	25	17.9
1-6	28	20
7-10	87	62.1
Admission to NICU		
Yes	45	32.1
no	95	67.9
Reason for NICU admission(n=45)		
Prematurity	40	88.9
Low birth weight	40	88.9
Perinatal asphyxia	10	22.2%
EONS	1	2.2
Perinatal complication/s		
abortion	8	12.5
IUGR	20	31.3

Still birth	17	26.6
Early neonatal death	32	50
Perinatal asphyxia	10	15.6
EONS	1	1.5
RDS	1	1.5

5.7 Predictor of maternal outcome

In the bivariate analysis, no antenatal care and follow up, severe blood pressure level at referral, maternal pulse rate > 100 bpm, delay in treatment initiation, and presentation with clinical signs and symptoms were significantly associated with poor composite maternal outcomes. In the multivariate analysis, after adjusting for potential confounders, three factors remained significantly associated with poor maternal outcomes. Women with no ANC follow-up were 2.1 times more likely to have poor outcomes compared to those with ANC (AOR = 2.1, 95% CI: 1.24–6.42, $p = 0.010$). A treatment delay of six or more hours from seizure onset to initiation of care remained a strong predictor (AOR = 11.3, 95% CI: 1.35–95.32, $p = 0.025$). Likewise, the presence of clinical signs and symptoms at presentation was independently associated with poor maternal outcomes (AOR = 4.6, 95% CI: 1.05–20.37, $p = 0.043$).

Table 3. The bivariate and multivariate logistic regression of association between maternal outcome and its predictor among women having eclampsia and managed at SPHMMC.

Variable	Composite maternal outcome		p-value	COR with 95%CI	P-value	AOR with 95%CI
	poor	good				
ANC						
Yes	46	37	1		1	
no	50	7	0.000	5.7(2.33, 14.15)	0.010	2.1(1.24, 6.42)
Number of ANC						
<8	31	21	0.321	1.6(0.64, 3.86)	0.110	0.32(0.08, 1.29)
≥8	15	16	1		1	
blood pressure at referral						
<140/90	10	9	1		1	
140/90-159/109	49	26	0.309	1.7(0.61, 4.69)	0.897	1.1(0.28, 4.35)
≥160/110	37	9	0.027	3.7(1.16, 11.78)	0.492	1.8(0.33, 9.98)
Pulse rate at admission						
60-100	55	39	1		1	
>100	41	5	0.001	5.8(2.11, 16.06)	0.648	0.71(0.17,

						3.07)
Time from seizure onset to treatment initiation in hours						
≤1	5	15	1		1	
2-6	25	21	0.032	3.6(1.11, 11.47)	0.213	2.9(0.54, 16.37)
≥6	66	8	0.000	24.7(7.09, 86.3.9)	0.025	11.3(1.35, 95.32)
Sign symptom at presentation						
Yes	85	21	0.000	8.5(3.57, 20.06)	0.043	4.6(1.05, 20.37)
no	11	23	1		1	

5.9 Predictors of perinatal outcome

In the bivariate analysis, women without antenatal care, severe hypertension at admission, elevated pulse rate, low maternal oxygen saturation, presence of right upper quadrant (RUQ) pain, having more than four convulsions, GCS score of 9–12 at arrival were significantly associated with poor composite perinatal outcomes. In the multivariate analysis, after adjusting for confounding factors, only a few variables remained statistically significant. Lack of ANC continued to be a strong independent predictor of poor perinatal outcomes (AOR = 5.6, 95% CI: 1.69–18.59, $p = 0.005$). Severe hypertension of the mother at admission ($\geq 160/110$ mmHg) also remained significant (AOR = 5.7, 95% CI: 1.70–46.39, $p = 0.013$).

Table 4. The bivariate and multivariate logistic regression of association between perinatal outcome and its predictor among women having eclampsia and managed at SPMMC.

Variable	Composite perinatal outcome		p-value	COR with 95%CI	P-value	AOR with 95%CI
	Poor	Good				
Maternal age						
<20	6	7	1		1	
20-34	54	56	0.841	1.1(0.36, 3.56)	0.552	1.8(0.27, 11.39)
≥35	12	5	0.181	2.8(0.62, 12.66)	0.083	8.7(0.76, 101.19)
Presence of ANC						
Yes	29	54	1		1	
No	43	14	0.000	5.7(2.69, 12.15)	0.005	5.6(1.69, 18.59)
Blood pressure at admission						
<140/90	3	16	1		1	
140/90-159/109	25	31	0.033	4.3(1.13, 16.44)	0.343	2.6(0.36, 18.85)

≥160/110	44	21	0.000	11.2(2.93, 42.60)	0.013	5.7(1.70, 46.39)
Maternal Pulse rate						
60-100	40	54	1		1	
>100	32	14	0.003	3.1(1.46, 6.53)	0.310	1.9(0.54, 6.76)
Maternal temperature						
<38	65	65	1		1	
≥38	7	3	0.234	2.3(0.58, 9.42)	0.583	0.59(0.09, 3.89)
Maternal oxygen saturation						
<90	28	14	0.020	2.5(1.15, 5.22)	0.481	1.7(0.41, 6.72)
≥90	44	54	1		1	
Maternal RUQ pain						
No	35	39	1		1	
yes	26	6	0.002	4.8(1.78, 13.10)	0.073	2.9(0.91, 9.84)
Number of convulsions						
≤4	45	54	1		1	
>4	27	14	0.030	2.3(1.08, 4.93)	0.083	0.22(0.04, 1.21)
GCS at arrival						
13-15	47	58	1		1	
9-12	15	5	0.018	3.7(1.25, 10.93)	0.089	4.3(0.80, 22.93)
≤8	10	5	0.120	2.5(0.79, 7.72)	0.992	1.1(0.15, 6.67)
Composite Perinatal outcome						
Good	15	29	1		1	
poor	57	39	0.006	2.8(1.34, 5.95)	0.235	0.45(0.12, 1.68)

6. Discussion

The main objective of this study was determining the adverse maternal and perinatal outcomes of Eclampsia and factors determining these outcomes. In this study, we found a significant proportion of women (more than 2/3) experienced composite adverse maternal outcomes. We also found high rate of adverse perinatal outcomes. Close to half of cases were complicated by adverse perinatal outcome. The main predictors of adverse maternal outcomes were lack of ANC follow up, treatment delay of more than or equal to 6 hours from seizure onset, and the presence of clinical signs and symptoms at presentation. Lack of ANC follows up and severe maternal hypertension at admission was independently associated with poor perinatal outcomes.

Strong evidences showed that pre-Eclampsia/Eclampsia is among the leading cause of maternal and perinatal mortality (8, 9, 10). In particular, eclampsia has the worst outcomes (9, 10, and 12).

In one earlier study conducted in Ethiopia, the case fatality-rate was 7 %.(17) In our study, we found 1.43 % over all case fatality rate. These findings are consistent with reports from Ethiopia and Nigeria, where aspiration pneumonia, HELLP syndrome, and acute kidney injury were among the leading complications of eclampsia (31, 27, 34).

The study identified several independent predictors of poor maternal outcomes. Lack of antenatal care (ANC) follow-up significantly increased the risk of adverse outcomes (AOR = 2.1), consistent with global and regional evidence demonstrating that inadequate ANC is associated with higher maternal morbidity and mortality in eclampsia (WHO 2015; 32). Additionally, delayed initiation of treatment after seizure onset (≥ 6 hours) was strongly predictive of poor maternal outcomes (AOR = 11.3), emphasizing the critical importance of early recognition and timely intervention, as also reported in Indian and Nigerian cohorts (21, 28). The presence of clinical signs and symptoms at presentation was independently associated with adverse maternal outcomes (AOR = 4.6), suggesting that women presenting with overt clinical manifestations are already at high risk for complications.

Regarding perinatal outcomes, nearly half of newborns (45.7%) experienced poor composite outcomes. Preterm delivery was common; with 25% of births occurring between 28–33+6 weeks, and 30% of neonates had low birth weight (1500–2499 g). NICU admission was required for 32.1% of neonates, mainly due to prematurity and low birth weight, and perinatal complications affected 45.7%, with early neonatal death (50%), intrauterine growth restriction (31.3%), and stillbirth (26.6%) being the most frequent. These findings align with multi-country studies, which have documented high rates of perinatal mortality in pregnancies complicated by preeclampsia and eclampsia, particularly in low- and middle-income countries (WHO 2015; 20, 21, 23).

Lack of ANC follow-up (AOR = 5.6) and severe maternal hypertension at admission ($\geq 160/110$ mmHg; AOR = 5.7) were significant independent predictors of poor perinatal outcomes. This underscores the importance of early detection and adequate antenatal management of hypertensive disorders in pregnancy to prevent fetal complications. The predominance of cesarean deliveries (60.7%) in this cohort, mainly indicated by non-reassuring fetal heart rate, failed induction, and malpresentation, is consistent with other studies showing high cesarean section rates in women with eclampsia (22, 27). Cesarean delivery may reduce perinatal

morbidity in cases of fetal compromise but may not completely mitigate risks associated with severe maternal disease.

Clinically, the majority of women (75.7%) presented with symptoms such as headache, visual disturbances, and right upper quadrant pain, reflecting the classical manifestations of eclampsia. Laboratory and clinical parameters indicated significant disease severity: nearly half presented with severe hypertension, 40% had oxygen saturation <90 %, and 10.7% had a Glasgow Coma Scale ≤ 8 . Treatment protocols included universal magnesium sulfate administration and anticonvulsants, with nearly half receiving antihypertensives and antibiotics. Despite timely interventions in some cases, a substantial proportion required HDU or ICU admission, reflecting the critical condition of patients at presentation.

The study highlights critical risk factors identified in the literature: delayed treatment, lack of ANC, severe hypertension, and elevated white blood cell counts, all of which are associated with maternal and perinatal morbidity and mortality. Comparative studies from Ethiopia, India, Nigeria, and China report similar patterns of complications, perinatal outcomes, and predictors, reinforcing the need for strengthened antenatal surveillance, rapid response to seizures, and early delivery planning in women with eclampsia (13, 21, 23, 27, 31, 34).

Strengths and limitations of the study

Being among the first to report on predictors of adverse maternal and perinatal outcome of eclampsia in Ethiopia is the main strength of this study. The other strength is the study took a relatively larger sample size compared to similar studies conducted before in Ethiopia.

The main limitations of the study are retrospective nature of the data, not employing random sampling techniques, and being a single center study.

7. Conclusion

The study revealed a high burden of adverse maternal and perinatal outcomes associated with eclampsia. Approximately 2/3 of women experienced poor composite maternal outcomes, with

the most frequent complications being HELLP or partial HELLP syndrome, acute kidney injury, severe persistent hypertension, and placental abruption. Significant predictors of adverse maternal outcomes included lack of antenatal care (ANC) follow-up and treatment delays of six hours or more from seizure onset. Perinatal outcomes were also concerning, with 45.7 % of neonates experiencing poor outcomes, predominantly prematurity, low birth weight, and NICU admission. Key factors associated with adverse perinatal outcomes were lack of ANC and severe maternal hypertension.

8. Recommendation

- Promote early and regular ANC attendance to identify and manage high-risk pregnancies.
- Implement community-based education programs emphasizing the importance of ANC follow-up.
- Strengthen rapid recognition and management protocols for pregnancy related complications, especially seizures.
- Ensure timely referral and emergency response systems in primary healthcare facilities.
- Develop standardized management guidelines for antihypertensive therapy in high-risk pregnancies.
- Ensure adequate intrapartum follow up and monitoring to detect fetal distress early.
- Strengthen neonatal care services, including NICU readiness and management of prematurity and low birth weight.
- Provide healthcare providers with training on managing obstetric emergencies like Eclampsia

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