Wondimu Gudu , Delayehu Bekele, *Ethiop Med J, 2018, Vol . 56, No. 2*

ORIGINAL ARTICLE

A PROSPECTIVE REVIEW OF ECLAMPSIA AT A REGIONAL HOSPITAL, EASTERN ETHIOPIA: INCIDENCE, CLINICAL CORRELATES, MANAGEMENT AND PREGNANCY OUTCOME.

Wondimu Gudu (MD, MPH)[1], Delayehu Bekele (MD, MPH)[1]

ABSTRACT

Objective: *The aims of the study were to determine the incidence of eclampsia and describe its clinical correlates and pregnancy outcomes.*

Patients and Methods*: A one-year prospective study of 93 cases of eclampsia using a structured questionnaire which included socio-demographic data, clinical presentation, work-up, management and feto-maternal outcomes was done at Karamara Regional Hospital, Eastern Ethiopia.*

Results*: The incidence of eclampsia was 2.7% (93 in 3500 deliveries). Most of the cases were young (45%), nulliparous (70%) women who had not received any antenatal care (63%). Almost two thirds of the women (n=57, 61%) presented with eclampsia in antepartum, whereas 26 cases (28%) occurred in intrapartum, and there were 10 cases (11%) with eclampsia postpartum. Preceding symptoms were reported in 78.5 % of patients with severe hypertension recorded in 66%. The average gestational age at presentation was 32 weeks. Hydralazine was used for emergency control of hypertension in 91% of the cases. Magnesium was administered to 92 (99%) of the patients. Delay greater than 12h from admission to delivery occurred in 45% of the women with eclampsia. Cesarean section (CS) was performed in 14 (17%) and instrumental delivery in 15 (18%). The maternal and perinatal case fatality rates of eclampsia were 34.7% and 11% respectively.*

Conclusion*: The incidence of eclampsia was very high with corresponding high maternal and perinatal deaths. The presentation of patients was late and the work up and management of cases substandard. Hence capacity building of health facilities, implementation of standard guidelines and criteria based auditing are recommended.*

Keywords*: eclampsia , pregnancy outcomes, eastern Ethiopia.*

INTRODUCTION

Eclampsia is defined as the development of convulsions and/or unexplained coma during pregnancy or postpartum in patients with signs and symptoms of preeclampsia (1). The incidence of eclampsia in developed countries is stable and estimated to be about 5–7 cases per 10,000 deliveries while it varies widely in developing countries, ranging from 1 case per 100 to 1 case per 1700 pregnancies (1-3). Eclampsia and preeclampsia account for about 63,000 annual maternal deaths globally; of note this figure may only refer to those mothers that reached a health facility (4).

It is also one of the major causes of perinatal mortality. The impact of the disease is disproportionately higher in developing countries where medical interventions may be ineffective due to late presentation of patients and health facility constraints (2). Although convulsions and/or coma are hallmark signs of eclampsia, the premonitory symptoms, the onset (timing) of convulsions, the clinical and laboratory findings of patients are variable (5). The onset of eclamptic convulsions can be antepartum (38-53%), intrapartum (18-36%), or postpartum (11-44%) (1,5). Around 20% of mothers may present without hypertension and 15% without proteinuria (1,5). Other than early detection of preeclampsia, there are no reliable tests or symptoms for predicting the development of eclampsia (6). Institutional care with close maternal monitoring, prevention and control of seizures through the use of anticonvulsants, treatment of severe hypertension, and timely termination of pregnancy reduces maternal mortality and serious morbidity (7). The decline in the incidence of eclampsia and improvements in disease outcome in developed countries have been attributed to improvements in antenatal and intrapartum care (8).

There is scarcity of data on eclampsia in Ethiopia. Limited studies suggest that it is one of the major maternal health problems with an incidence varying from 0.2% to 1.2%. The reported maternal deaths from eclampsia in hospital studies varied from 6.5% in 1983 to 35.7% in 2008 (9). The current study is the first of its kind to comprehensively review eclampsia prospectively in Ethiopia. It intends to contribute to the knowledge gap in the incidence,

[1]Department Of Obstetrics and Gynecology, St. Paul Hospital, Millennium Medical College
Corresponding author email: wondgu@yahoo.com

pattern of presentation, clinical care and outcomes of pregnancies complicated by eclampsia, and to highlight areas of future intervention for improving quality of eclampsia care in the study area. Specifically, study objectives included the assessment of the incidence of eclampsia, the description of socio-demographic and clinical correlates, the evaluation of patient workup and management of patients, the determination of pregnancy outcomes, and the identification of areas for future improvement in eclampsia care at Karamara General Hospital, Eastern Ethiopia.

PATIENTS AND METHODS

A hospital based prospective cross-sectional study was conducted for one year (from March 2014 to February 2015) at Karamara Regional Hospital located in Jigjiga town of the Somali Regional State, Eastern Ethiopia which is located 780 km away from the capital, Addis Ababa. According to the 2008 National baseline emergency maternal and newborn care (EMONC) assessment, there are 5 hospitals (3 governmental) and 21 health centers involved in the provision of emergency obstetric and newborn care in Somali region. These facilities serve a population of nearly 5 million. According to the 2016 demographic and health survey (DHS) data, the skilled birth attendant rate was 7.6%. Karamara hospital is the only regional hospital which also serves as the highest referral center for the region. The hospital provides all-round comprehensive emergency obstetric care with an estimated 3500 deliveries annually; however, it has neither adult nor neonatal intensive care units. Eclampsia is one of the most common complications of pregnancy in the OBGYN wards including obstetric hemorrhage and sepsis. One year prior to the onset of this study, magnesium sulphate replaced diazepam as the anticonvulsant of choice. The study subjects were all pregnant women admitted to Karamara Hospital with a diagnosis of eclampsia (as confirmed by senior obstetricians). Purposive sampling was used and all women with eclampsia during the study period (one year) were included.

All women (pregnant and postpartum) admitted to the obstetric and gynecologic wards of Karamara Hospital with raised blood pressure and convulsions and/or coma irrespective of gestational age as confirmed by senior obstetricians, and willing to participate in the study were included. Women with convulsions and/or coma secondary to other medical illnesses (e.g. epilepsy, cerebral malaria, and stroke) were excluded.

In this study, eclampsia was defined as convulsions and/or unexplained coma during pregnancy after 24 wks of gestational age or in postpartum patients after other medical causes were ruled out. Proteinura was defined as the presence of protein on microscopic urine examination (graded at least 1+). Severe hypertension was defined as systolic blood pressure at least 160 mmHg or higher, and/or diastolic blood pression at least 110 mmHg. Early neonatal death represented deaths of newborns within 7 days of birth. Preterm delivery was defined as delivery less than 37 weeks of gestational age. Perinatal asphyxia was defined as an APGAR score < 7 at birth with cardiorespiratory and neurologic depression.

Data collection was made using a pretested, structured and interviewer administered questionnaire. The questionnaire was prepared in English. For interviewing, the Somali language was used. Data collectors were ward nurses who comprehended both English and Somali Languages. An experienced nurse was employed for supervision of data collection. Data collectors were trained for 2 days by investigators. The questionnaire included questions on socio-economic data, risk factors for eclampsia, antenatal care (ANC) booking status, clinical presentation of cases, work up of cases, observed maternal and neonatal complications, management and outcome of cases. Data were extracted both from interviewing of eclamptic women and/or their attendants and from patients' clinical records. The questionnaires were attached with patients' folders throughout their stay in the wards and perinatal and maternal outcomes were recorded upon discharge of patients. Explanation was given to the participants about the study, written consent was obtained and anonymity in data collection assured. Ethical clearance for the conduct of the study was secured from the health research ethics committee under Somali Regional State Health Bureau.

Data collection accuracy was checked by an inspector, entered, and analyzed using the EPI INFO 2002 statistical package. Proportions, means, tables and graphs were used for data summarization and presentation.

RESULTS

Socio demographic data: There were 93 cases of eclampsia in 3500 deliveries during the study period with an incidence of 2.7% (Table 1). Most were young (45.2% ≤ 20 years) with a mean age of 23.0 years; nullipara (70.0%); illiterate (70.0%); low income (61.3%); married (95.7%) and residing out of the capital Jijiga (67%).

Clinical Presentation: The commonest presentation of patients was with convulsion in 84 (90.3%), and 9.7% presented with coma without prior report of seizures. The mean duration of complaints before presentation was 14hrs with range of 1 to 72 hrs. Precedent symptoms were reported in 73 (79.0%) of the patients. The most frequently reported symptoms were: severe headache in 66 (71.3%), blurring of vision in 44 (47.3%) and epigastric pain in 17 (18.3 %). Gestational age of most of the pregnancies (90%) was estimated by clinical examination and

ultrasound scanning as the mothers did not have reliable last menstrual period (LMP). The average gestational age for those mothers with ante/intrapartum eclampsia was 32.0 weeks and most, 90 (96.8%), were singleton pregnancies. Of these 3.5% were previable (<28wks), 62.3% preterm (<37wks) and 34.1% term (> or = 37 wks).

Most women who presented with eclampsia (63.4%) had not received any antenatal care. One or more risk factors for preeclampsia/eclampsia were reported in 75 (80.7%) of the mothers. These include primagravidity in 66 (71.0%), teenage pregnancy in 22 (23.7%), previous history in 3 (3.2%), twin pregnancy in 3 (3.2%), and chronic hypertension in 2 (2.2%). Precedent clinical diagnosis of hypertensive disorder of pregnancy was made in 8 (8.6%) of the patients. Of these, all were diagnosed between 7 to 60 days prior to developing eclampsia with mean of 29.1 days. Most, 5 (62.5%), had preeclampsia; 2 (25.0%) had superimposed preeclampsia and 1 (12.5%) had chronic hypertension. Five (62.5%) of these patients were on aldomet.

Antepartum seizures occurred in 57 (61%) with a further 26 (28%) having intrapartum seizures and 10 (10.7%) postpartum seizures. Most, 84 (90.3%), had their first episode at home and 10.0% at the health facility after being admitted in labor and/or for management of preeclampsia. Thirty-four (36.6%) of the patients were referred from other health facilities.

Most of the patients with eclampsia (53.8%) were semiconscious at admission while 29.0% were unconscious. Only 5 (5.4%) of the mothers were normotensive upon admission. Among the hypertensive women, the mean systolic blood pressure was 164 mmHg and the mean diastolic blood pressure (DBP) was 110.0 mmHg. Systolic blood pressure (SBP) > 160 was recorded in 64.5% with a range of 110-240. Diastolic blood pressure > 110 mmHg (severe hypertension) was recorded in 65.6% with a range of 70–140 mmHg.

Work UP and Management: Laboratory/imaging tests done were: ultrasound in 31 (33.3%), hematocrit in 91 (98%), urinalysis in 92 (99%), blood group in 82 (88%), random blood sugar levels in 8 (8.6%), blood films in 24 (26%), liver function test in 3 (3%), renal function tests in 3 (3%), and serum uric acid in 2 (2%). No patients had serum coagulation profiles or platelet counts done. Proteinuria was detected in 88 (95%) of the mothers with half of them having +2 (Table 3). Anemia was seen in 52 (58%) patients. Magnesium sulphate was administered to all (99%) except a single case that was given diazepam. Magnesium sulphate was effective in controlling convulsions in 87 (93.6%) of the patients. In 97% of the cases magnesium sulphate administration continued for 24 hours. Six (6.5%) of the patients who had convulsions after administration of magnesium sulphate had their seizures within 1 hour after the first dose. Antihypertensive medication was given for a total of 82 patients (88.2%). Short-acting antihypertensives for acute control of severe hypertension (DBP>110 or SBP >170mmhg) were needed in 65 (76.5%) of the patients and long acting in 73 (86%). A single anti-hypertensive (hydralazine) was used for acute control of hypertension in 63 (96.9%) of the patients. The mean dose of hydralazine was 23.0 mg range (5- 65). Most (74.2 %) required a dose of ≤ 25 mg. Combined hydralazine and nifedipine were used in the remaining (3.0%) of the eclamptics. Labetalol was never used. Antibiotics were administered in 89 (95.7%) of the patients. The most commonly used antibiotic was ampicillin in 37 (42%) followed by ceftriaxone in 29 (32.6%) patients.

Out of the 57 patients who presented with antepartum eclampsia, 9 refused termination and were discharged against medical advice, and 2 died on arrival. Out of the remaining 46 patients, 7 (15.2%) underwent emergency cesarean delivery and 27 (58.7%) were induced. Augmentation of labor was needed in 8/37 (22%) of those mothers who presented with intrapartum eclampsia. The mode of delivery for the 72 mothers who gave birth at the hospital was caesarean in 14/72 (19.4%), instrumental in 15 (20.8 %), and spontaneous vaginal in 43 (59.7%). The CS rate at the hospital at the same period was 12.5%. The anesthesia used during CS were: general anesthesia in 11 (78.6%), spinal anesthesia in 2 (14.3%) and local infiltration in 1 (7.1%). The mean interval from admission to delivery was 25 hrs (range 1-168 hrs) and only 55% were delivered within 12 hrs of admission. Termination of pregnancy was delayed in 17 (40%) of the patients because of patients/family failure to consent timely upon initial counseling. The mean duration of delay because of initial patient/family refusal for termination was 48 hrs (range 3 to 144 hrs). Nine of the eclamptic patients were discharged against medical advice.

Maternal and perinatal outcomes: One or more complications were seen in 49 (53%) of the mothers and 47 (62.7%) of the babies (Tables 2 and 4). Maternal complications were more common in those with postpartum eclampsia, 9 of 10 (90%) compared to those with antepartum and intrapartum eclampsia. The most common maternal complications were renal failure in 23.5%, sepsis in 14%, pulmonary edema in 9.5%, and aspiration pneumonia in 9.5%. The mean duration of maternal hospital stay was 5 days (range 0- 15 days) and most (71%) were improved upon discharge. There were 34 maternal deaths in the study period. 10 maternal deaths were caused by eclampsia giving a case fatality rate of 11%. Out of the 10 deaths, 2 occurred in undelivered mothers. All the maternal deaths occurred in those patients who developed one or more complications. Eclampsia accounted for 29% of all maternal deaths during the study period, the proportionate mortality rate. Table 3 summarizes clinical data by maternal survival status.

The preterm delivery rate was 63%. Out of the 75 neonates delivered at the hospital (including 3 twin sets), 47 (62.7%) were live births, 19 (25.3%) stillbirths, and 7 (9.3%) early neonatal deaths. The mean birth weight was 2365 gm (range 680gm – 3700gm). There were 26 perinatal deaths among 75 deliveries from women with eclampsia indicating a perinatal case fatality rate of 34.6%. The other perinatal complications are listed in

Table1: Socio-demographic characteristics of patients by timing of Eclampsia

	Timing of Eclampsia			
Characteristics	Antepartum (n=57)	Intrapartum (n=26)	Postpartum (n=10)	Total 93 (%)
Address				
Jigjiga Town	17 (29.8%)	11(42.3%)	3 (30%)	31 (33.3%)
Out of Jijiga	40 (70.2%)	15 (57.7%)	7 (70%)	62 (66.7%)
Marital Status				
Married	53 (93%)	24 (92.4%)	9 (90%)	86 (92.5%
Single	2 (3.5%)	1(3.8%)	1 (10%)	4 (3.2%)
Others (divorced/separated)	2 (3.5%)	1 (3.8%)	0	3 (4.3%)
Ethnicity				
Somali	55 (96.5%)	24 (92.3%)	10 (100%)	89 (95.7%)
Oromo	2 (3.5%)	2 (7.7%)	0	4 (4.3%)
Religion				
Muslim	56 (98.2)	25 (96.1%)	10 (100%)	91 (97.8)
Christian	1 (1.8%)	1 (3.9%)	0	2 (2.2%)
Literacy				
Illiterate	41 (71.9%)	16 (61.5%)	7 (70%)	64 (68.8%)
Write/read	1 (1.8%)	1 (3.8%)	0	2 (2.2%)
Primary	11 (19.3)	9 (34.6%)	3 (30%)	23 (24.7%)
Secondary and above	4 (7%)	0	0	4 (4.3%)
Occupation				
Housewife	51 (89.5%)	23 (88.5%)	8 (80%)	82 (88.1%)
Merchant	1 (1.8%)	2 (7.7%)	1 (10%)	4 (5.4%)
Other	5 (8.7%)	1 (3.8%)	1 (10%)	7 (6.5 %)

Table 2: Maternal Complications by timing of eclampsia

Complication	Antepartum (N=57)	Intrapartum (N=26)	Postpartum (N=10)	Total (N=93)
1. Renal failure	12 (21.2%)	7 (26.2%)	3 (30%)	22 (23.7%)
2. Aspiration Pneumonia	4 (7.0%)	2 (7.7%)	3 (20%)	9 (9.7%)
3. Pulmonary Edema	7 (12.3%)	1 (3.9%)	1 (10%)	9 (9.7%)
4. Hepatic Failure	1 (1.8%)	0	2 (20%)	3 (3.2%)
5. Abruption placentae	2 (3.5%)	5 (19.2%)	0	7 (7.5 %)
6. Postpartum haemorrhage	2 (3.5%)	2 (7.7%)	4 (40%)	8 (8.6%)
6. Sepsis	4 (7%)	4 (15.4%)	5 (50%)	13 (14%)
7. Intracranial Haemorrhage	1 (1.8%)	1 (3.9 %)	2 (20%)	4 (3.2%)
8. Others (DIC, HEELP....)	2 (3.5%)	2 (7.7%)	1 (10%)	5 (5.4%)
9. Maternal death	5 (8.7%)	2 (7.7%)	3 (30%)	10 (11%)
Total	25/57 (44%)	15/26 (58%)	9/10 (90%)	93
No complications	32	11	1	44

Table 3: Clinical variables stratified by maternal mortality

Variable	**Deaths** (n/%) (N=10)	**Survivors** (n/%) (n=83)
Age (n=93)		
< 20	3 (30%)	19 (23%)
20 to 35	6 (60%)	55 (66.2%)
> 35	1(10%)	9 (10.8%)
Parity (n=93)		
0	7 (70%)	58 (69.9%)
1 to 5	2 (20%)	20 (24.1%)
≥ 6	1 (10%)	5 (6%)
ANC status (n=93)		
Unbooked	8 (80%)	51 (61.4%)
Booked	2 (20%)	32 (38.6%)
Gestational Age (n=93)		
Preterm (28 – 36 wks)	6 (60%)	56 (68.4%)
Term (≥ 37wks)	4 (40%)	27 (31.6)
Timing of eclampsia (n=93)		
Antenatal	7 (70%)	74 (89.2%)
Postpartum	3 (30%)	9 (10.8%)
Convulsions to presentation interval (n=93)		
≥ 12hrs	5 (50%)	42 (50.6%)
< 12hrs	5 (50%)	41 (49.4%)
BP at admission (n=93)		
DBP ≥ 110	7 (70%)	55 (66.3%)
DBP 100 to 109 mmhg	2 (20%)	21 (25.3%)
DBP < 100mmhg	1 (10%)	7 (8.4%)
Proteinuria (n=92)		
Negative/trace	1 (10%)	4 (5%)
+1	1 (10%)	8 (9.8%)
+2	3 (30%)	30 (36.6)
+3	5 (50%)	40 (48.8%)
GCS at admission (n=93)		
< 5 (unconscious)	1 (10%)	15 (18.1%)
5 – 8 (semi-conscious)	2 (20%)	48 (57.8%)
≥ 8 (conscious)	7 (70%)	20 (24.1%)
Admission- delivery interval (n=72)		
≥ 12hrs	4 (57.1%)	35 (53.8%)
< 12hrs	3 (42.9%)	30 (46.2)
Mode of delivery (n=82)		
Vaginal	7 (87.5%)	61 (82.4%)
Cesarean	1 (12.5%)	13 (17.6%)

Table-4 Perinatal complications in pregnancies with antenatal Eclampsia delivered at Karamara Hospital (n=75)

Complication	**Frequency**	**Percent**
1. Preterm delivery	47	65.3%
2. IUGR	8	10.7 %
3. Still birth	19	25.3%
4. Perinatal asphyxia	26	34.7%
5. Low birth Weight	34	45.3%
6. Early neonatal death	7	9.3 %

DISCUSSION

Eclampsia presents one of the most life-threatening conditions in pregnancy and management is complex. Worldwide, approximately 14% of maternal deaths are caused by pre-eclampsia and eclampsia; in Africa about 10% of maternal deaths are caused by hypertensive disorders in pregnancy (10). The 2.7% incidence of eclampsia in our study is higher than all previous reports from hospital based Ethiopian studies which have ranged from 0.3% to 2.0% (11 – 15). It is also high compared to hospital-based incidences from most African countries which vary from 1.8% to 7.1% (2), notably 1.37% in Tanzania (16), and 1.57% in Nigeria (17). However, it is less than the 5% reported in another Nigerian study at a tertiary university hospital (18). The high incidence of eclampsia in our study area might be ascribed to the large number of referrals (37% of all eclampsia cases) and/or increased access to obstetric health services for eclampsia. The possibility of high disease burden imposed by preeclampsia/eclampsia in the study area was also expressed by one study (19). We share this concern and suggest a well designed community based study to be conducted primarily in pastoralist regions to identify possible underlying geographic factors.

The fact that eclampsia was most common in young (45.2%) and nulliparous (70%) women is in accordance with many previous literature reports (5,16). The antepartum convulsion rate of 61% is comparable with previous reports (5,17,20). However, our observed intrapartum convulsions (31%) were higher than postpartum convulsions (11%) which contrasts with observations in developed countries where postpartum eclampsia is becoming more common (20). This reflects the disparity in efficiency of early detection and effective management of preeclampsia/eclampsia between developed and developing nations.

Only 54.8% of the patients presented within 12 hrs of convulsion and 7.5% of them presented after 24 hours. This is less than the 83.3% within 12 hrs in a Nigerian study (18), but comparable to the 8.2% presentation after 24 hrs in the same study (18). There could be individual, socio-cultural, or health facility factors affecting timely presentation of patients. Timeliness of presentation in eclampsia is crucial particularly in developing countries as it influences effectiveness of medical interventions. Most of the eclamptic women (79%) had prodromal symptoms but the majority (67%) did not have any previous antenatal visits. Improving access to focused ANC may improve pregnant mothers' awareness of danger signs of eclampsia and prompt early health care seeking. However, eclampsia can develop without any precedent warning symptoms and signs as evidenced in the 21% of the asymptomatic patients in our study; this is similar to the 20% asymptomatic presentations reported in the literature (1,6).

Laboratory test-particularly biochemical-are presumed to be markers of end organ damage in preeclampsia/ eclampsia; however, the majority of eclamptic patients in this study did not have complete (essential) lab tests done. This implies that facilities are not adequately equipped with the necessary diagnostic equipment and/or reagents. The same finding was reported in the nationwide study where majority of Ethiopian health facilities, especially health centers, were lacking important diagnostic tests (12). This has an impact on the provision of effective care for cases of eclampsia. The management of some patients who might benefit from timely decision of pregnancy termination based on biochemical test results and those with organ failure who might need timely referral to higher centers could be compromised. It is recommended that in order to improve the effectiveness and quality of eclampsia care in the study area there should be capacity building at all levels of health facilities including ensuring the availability of essential equipment for the diagnosis of eclampsia and early detection of eclampsia and its complications. The fact that magnesium sulphate was used in almost all (97%) cases is impressive as this has been a recent introduction in the Ethiopian setting. The use of magnesium sulphate was higher than previous reports in similar settings, notably the 23% and 35.8% in two Nigerian studies (17,20). In Ethiopia, only 11% of facilities reported having magnesium sulfate in 2008 (12). Results in this study also demonstrated good responses as only 6.4% of the cases had a repeat convulsion after first dose.

Antihypertensive treatment is recommended when blood pressure exceeds 160/100 mmHg. There are three recommended options: hydralazine, labetalol or nifedipine. Like many developing countries, the most commonly used short acting antihypertensive was hydralazine (97.0%). A total hydralazine dose of >25 mg was needed in 26% of the patients who should have been given a second short acting antihypertensive (nifedipine). Labetalol was never used which implies unavailability of the drug. This was also seen in the 2008 National Emergency Obstetric Care Assessment where only 4.5% of the hospitals were using labetalol (12).

Most of the cases with patients with eclampsia (97%) were given antibiotics but the use was erratic with a wide variation in the choice and duration of antibiotics. A standard recommendation on antibiotic administration should be included in all eclampsia care guidelines so as to promote uniform and rational use of the limited antibiotics.

A substantial proportion (40%) of women with antepartum eclampsia or their families refused termination on initial counseling and nine patients were discharged against medical advice. This might reflect poor knowledge of the community on emergency obstetric conditions and their management, negative attitude towards medically indicated termination of pregnancy, lack of knowledge of complication readiness, and preference for

alternative (cultural) remedies. Hence raising community awareness through socio-culturally sensitive health education in the area is important.

Generally, there was delay in the time interval of admission to delivery. Only 55% of patients were delivered within the recommended 12 hrs of admission (22,23). This was lower than the 74% reported from studies on timeliness of eclampsia care in three developing countries (22). Delivery is the cure for eclampsia and timeliness of intervention is crucial to avert maternal deaths and the risk of morbidity from complications. Although patients' refusal might contribute to the delay in our study, underlying institutional and/or health provider factors might also be the reasons. These should be identified, preferably through criteria-based auditing, and modified.

Eclampsia increased the risk of CS and instrumental deliveries as the rate of CS (19.4%) and instrumental delivery (22%) were higher than the rates in the general obstetric population in the hospital during the same period, which were 12.5% and 14%, respectively. However, the overall caesarian section rate in Karamara Hospital was still low compared to all other previous studies. In Ethiopia CS rates have varied from 36.6% in Jimma (11) to 45.3% in Addis Ababa teaching hospitals (13,14), while reports from other African studies have ranged from 29.4% and 75% (16-18,20). The maternal complication rate of 53% was higher than the 39.2% and 37.7% reported in two Nigerian studies (16,20). Higher incidences of acute renal failure (23%) and aspiration pneumonia (9.3%) were seen in our study compared to the 3.8% and 5% rates reported in the two Nigerian studies (16,20), whereas incidence of other complications was comparable. Nonetheless, high rates of sepsis, pulmonary complications, abruptio placentae and postpartum haemorrhage coupled with unavailability of an intensive care unit and/or bloodproducts would definitely impact maternal and perinatal deaths.

The case fatality rate of 11% in our study was comparable with the 13% rate in Ethiopia by Zufan and Misganaw (12), and that of most African studies which range from 7.5% to 13% (15,16,23), but higher than the other studies in Ethiopia which range from 3.6% to 5.2% (11,12,14). The maternal mortality rate of 285/100,000 and the perinatal case fatality rate of 346/1000 deliveries were also high compared to studies from Ethiopia and other African countries. Maternal mortality rates from 98/100,000 to 118/100,000 have been reported (13, 17), and perinatal case fatality rates from 132/1000 to 300/1000 deliveries (11,14,15,18,20). This high maternal and perinatal mortality is concerning as the rate-in particular the perinatal mortality-is even higher than the reports in those studies done when the use of magnesium sulphate was very limited in Ethiopia (13,15). The fact that the hospital is the major regional referral center might have resulted in a higher percentage of complicated referrals. Other factors such as lack of adult/ neonatal ICU, delayed presentation of patients, and delayed and suboptimal eclampsia care could have contributed to the high maternal/neonatal mortality. These all reflect clinical and public health challenges of eclampsia in similar peripheral areas of Ethiopia.

Conclusion: The incidence of eclampsia is very high with corresponding high maternal and perinatal deaths which might necessitate a large-scale study to identify possible geographic factors. The presentation of patients with eclampsia is late and the work up and management of cases is substandard. Hence capacity building of the health facilities and professionals at all levels in early diagnosis and timely provision of comprehensive pre-eclampsia/eclampsia care as well as improving access to maternal health facilities are recommended. Appropriate advice on danger signs of preeclampsia/eclampsia should be given at antenatal care clinics.

ACKNOWLEDGEMENTS

We are deeply indebted to Gete Sorsa for computer typewriting of the draft and final manuscript and for her continuous encouragement and we thank all ward staffs involved in data collection.

REFERENCES

1. Coppage, K, Sibai, B, Glob. libr. women's med. (ISSN: 1756-2228) 2008; DOI 10.3843/GLOWM.10158.
2. Osungbade KO, Ige OK. Public Health Perspectives of Preeclampsia in Developing Countries: Implication for Health System strengthening. J Pregnancy.2011;2011:481095.
3. Liu S, Joseph KS, Liston RM, et al. Incidence, risk factors and associated complications of eclampsia. Obstet Gynecol. 2011: 118:984-94.
4. Duley, L.The global impact of pre-eclampsia and eclampsia. Semin Perinatol. 2009 Jun;33(3):130-7.
5. Norwitz ER.2017. Eclampsia. In J. A. Melin (Ed.), UpToDate. Available from: https://www.uptodate.com/contents/ eclampsia.

6. Sibai BM. Diagnosis, prevention, and management of eclampsia. Obstet Gynecol. 2005;105(2):402-10.
7. Cunningham FG, Gant NF, Leveno KJ, Gilstrap LC , Hauth JC, Wenstrom KD, editors. Williams Obstetrics 21st ed. New York:McGraw-Hill.2001.
8. Goldenberg RL, McClure EM, Macguire ER, Kamath BD, Jobe AH. Lessons for low income regions following the reduction in hypertension-related maternal mortality in high-income countries. Int J Gynecol Obstet 2011;113(2):91–5.
9. Abdella A. Maternal Mortality Trend in Ethiopia. Ethiop. J. Health Dev. 2010;24 Special Issue 1:115-22.
10. The World Health Organization. WHO recommendations for Prevention and treatment of pre-eclampsia and eclampsia. Geneva, Switzerland.2011. Available from: http://apps.who.int/iris/bitstream/10665/44703/1/9789241548335_eng.pdf
11. Zenebe W, Segni H, Woldie M. Hypertensive disorders of pregnancy in Jimma University specialized hospital. Ethiop J Health Sci. 2011 Nov; 21(3):147-54.
12. Gaym A, Bailey P, Pearson L, Admasu K, Gebrehiwot Y. Disease burden due to pre-eclampsia/eclampsia and the Ethiopian health system's response. Int J Gynaecol Obstet. 2011 Oct;115(1):112-6.
13. Abate M, Lakew Z. Eclampsia a 5 years retrospective review of 216 cases managed in two teaching hospitals in Addis Ababa. Ethiop Med J. 2006 Jan;44(1):27-31.
14. Teklu S, Gaym A. Prevalence and clinical correlates of the hypertensive disorders of pregnancy at Tikur Anbessa Hospital, Addis Ababa, Ethiopia. Ethiop Med J. 2006 Jan;44 (1):17-26.
15. Mekbib TY, Ketsela K. Preeclampsia /eclampsia at Yekatit 12 hospital Addis Ababa. East Afr Med J. 1991 Nov;68 (11):893-9.
16. Urassa DP, Carlstedt A, Nyström L, Massawe SN, Lindmark G. Eclampsia in Dar es Salaam, Tanzania -- incidence, outcome, and the role of antenatal care. Acta obstetricia et gynecologica Scandinavica. 85(5):571-8. 2006.
17. Eke AC, Ezebialu IU, Okr C. Presentation and Outcome of Eclampsia at a Tertiary Center in South East Nigeria – A 6 -Year Review**.** Hypertension in Pregnancy, 30:125–132, 2011.
18. Yakasai IA, Gaya SA. Maternal and fetal outcome in patients with eclampsia at Murtala Muhammad specialist Hospital Kano, Nigeria. Ann Afr Med 2011;10:305-9.
19. Daniel T. Does preeclampsia/eclampsia pose a higher disease burden to mothers in pastoralist communities in Ethiopia? Ethiop Med J. 2011 April; 49 (2):17-26.
20. Jido TA. Eclampsia: maternal and fetal outcome. African Health Sciences 2012; 12(2): 148 – 52.
21. Zwart JJ, Richters A, Ory F, de Vries JI, Bloemenkamp KW, van Roosmalen J. Eclampsia in the Netherlands. Obstet Gynaecol 2008;112(4):820-7.
22. Edson W, Burkhalter B, McCaw-Binns A. Timeliness of care for eclampsia and preeclampsia in Benin, Ecuador, and Jamaica. International Journal of Gynecology and Obstetrics. 2007;97:209–14.
23. Kidanto HL, Mogren I, Massawe SN, Lindmark G, and Nystrom L. Criteria-based audit on management of eclampsia patients at a tertiary hospital in Dar es Salaam, Tanzania. BMC Pregnancy and Childbirth 2009; 9:13.