

Original Article**Risk factors for mortality among eclamptics admitted to the surgical intensive care unit at Tikur Anbessa Hospital, Addis Ababa, Ethiopia.**Eyob Berihun M.D.¹, Asheber Gaym M.D.²**Abstract**

Background: Facilities for intensive care are scarce in low-resource settings. Identifying determinants of mortality among eclamptics requiring intensive care will provide insight regarding prioritization as to which group of eclamptics would benefit from earlier referral or transfer to ICU this will improve survival in the face of scarce resources available for ICU.

Setting: Tikur Anbessa Hospital, a teaching and central referral hospital in Addis Ababa, Ethiopia.

Objectives: To identify risk factors associated with mortality of eclamptics who required intensive care after admission to TAH- SICU.

Methods: A ten years retrospective, hospital based case-control study. The case records of eclamptics admitted to the SICU during the study period were reviewed. Cases were those mothers who died, with the survivors acting as controls. Several variables were assessed among the cases and controls to assess their risk towards mortality; OR and 95% CI computed.

Results: The majority were below the age of 30 years, 124 (84.4%); nulliparous 103 (70.1%) and from Addis 113 (76.9%). Lateralizing signs were observed in 11(7.5%). Age greater than 29 years (OR 3.29; 95% CI, 1.18-9.12); being a housemaid (OR 5.93; 95% CI, 1.13-34.15); multiparity (OR 3.32, 95% CI 1.40-7.87) and the presence of lateralizing signs at admission (OR 4.57; 95% CI, 1.12-19.04) were significantly associated with the risk of mortality. The overall SICU case fatality rate was 25.9 %.

Conclusion: More vigilant attention should be given to eclamptics older than 29 years, those with low-socioeconomic status, multiparous mothers and presence of lateralizing signs at admission. Prioritizing ICU admission to these groups may improve survival. There is a need to conduct more studies on ICU mortality to come up with more detailed indications for prioritizing ICU admission.

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Introduction

Hypertensive disorders of pregnancy are common and form one of the deadly triads of maternal mortality. In a report from the USA by Berg and colleagues (1996), 18% of maternal deaths from 1987-1990 were related to pregnancy induced hypertension. Reports from developing countries indicate that PIH particularly eclampsia account for about 11% of maternal mortality being only third to hemorrhage, 24% and infectious causes 17% (1,2). Of all the diverse conditions lumped under the broad classification of PIH, eclampsia poses the greatest risk to maternal mortality.

Eclampsia is the occurrence of convulsions and/or coma unrelated to other cerebral conditions in a patient with signs and symptoms of preeclampsia. Eclampsia is primarily a disease of the young primigravida. Stroganoff in 1900 reported 5.4% mortality compared to 17-29% for European clinics and 21-49% for American clinics of the same period (3). Current incidence in the developed world is small and varies from 0.27 per thousand to 0.49 per thousand ⁴⁻⁸ The

rate in developing countries is as high as 13 per thousand deliveries. The provision of ANC services, early diagnosis and hospitalization with administration of prophylactic magnesium sulphate for severe pre eclampsia is said to contribute to the markedly lower incidence in the developed world (9).

The few available data from Ethiopia report incidences of 3.1-3.3 per thousand deliveries in 1989 and 1969 respectively (10, 11). A 7.1 per thousand incidence was noted at two teaching hospitals in Addis Ababa in a five year period by Abate in 1999 ¹². He noted that the incidence of eclampsia was higher in those without ANC and twin gestations. Eclamptic convulsions may occur antepartum (50%), intrapartum or postpartum (25% each) (13). Severe preeclampsia and eclampsia present management challenges which may only be successfully met by facilities and expertise offered in high dependency or intensive care units (HDU/ ICU). Both are characterized by the availability of more intensive nursing and medical care and more sophisticated monitoring and

support of vital functions that is not available in general wards. Eclampsia require intensive care when there is failure of the function of an organ system/s. A dedicated obstetric HDU/ICU is highly desirable in the early detection and management of eclampsia complications. Any woman in whom the diagnosis of severe preeclampsia or eclampsia is made is ideally managed in a HDU. The common indications for transfer to an ICU are refractory eclampsia, respiratory failure, cardiovascular instability, central monitoring and renal insufficiency (14). The primary goal of treatment of women with eclampsia is to control the BP, control convulsions and termination of pregnancy (15). When eclampsia is complicated with end organ damage, additional management in reference to organ support until the acute episode subsides is required.

There is a severe shortage of facilities for intensive care in low-resource countries like Ethiopia. This creates difficulties in timely transfer of eclampsia for intensive care and at times death prior to transfer. The aim of

this study is to identify possible risk factors associated with mortality from complications of eclampsia. This will give insight as to which groups of patients would benefit from early referral, transfer or admission for management in the SICU in order to improve survival in the face of the scarce resources and manpower in our setting. TAH-SICU is the only facility in Addis Ababa where eclamptic patients referred from the city requiring intensive care are admitted and managed. It is reasonable to consider that data obtained from patients admitted to this unit may give insight as to the main clinical data of the eclamptic episode, the obstetric profile, therapeutic measures taken and the risk factors associated and frequency of complications among those that survived and those who died in the Ethiopian setting. The objective of the study is to evaluate risk factors associated with mortality in eclamptic patients who required intensive care after admission to Tikur Anbessa Hospital SICU during the study period.

Subjects and Methods

A ten year hospital based retrospective case-control study on eclamptics admitted to the surgical intensive care unit of Tikur Anbessa Hospital- a central referral hospital -covering the period from October 1995 to September 2004 was conducted. All eclamptics admitted and managed at the unit during the study period were included in the study. Those who died at the SICU were taken as cases, while those who were discharged or transferred improved were the controls.

Tikur Anbessa Hospital is a central referral hospital in Addis Ababa, Ethiopia equipped with a SICU staffed by anesthesiologists, anesthesia residents and trained nurses. The ICU has six beds and as the only ICU in the city at the time of the study, all eclamptics who required intensive care during the studied period were admitted to the unit. Due to the shortage of ICU beds only patients who fulfill certain criteria are granted admission to the ICU. These include unstable vital signs, airway obstruction, respiratory failure and immediate postoperative cases.

Admitted cases of eclampsia were identified from the SICU admission and discharge registration book, their case records retrieved from the hospital archives and information on sociodemographic and clinical parameters were collected using a structured data collection format. The EPI-Info Version 6 statistical software was used to analyze the data. The chi-square test was used to compare proportions and a p-value of 0.05 was taken as the significance level. Odd's ratios with 95% CI were computed for comparison variables. Multivariate analysis of age and parity was done using the SPSS statistical software.

Results

During the ten years studied, 176 eclamptics were admitted to the SICU of the hospital. From the archives, 147 (83.5%) charts were retrieved. Admission rates for eclampsia progressively increased from 3(2%) in 1995 to 22(15%) in 2004 of total SICU admissions. Majorities were in the age groups of 20-29, 83 (56.5%), (Table 1, 2). Patients age ranged from 15-39 years

with the mean age of all eclamptics being 23.4 (SD 5.2). Survivors had a significantly less age 22.6 (SD 4.9) compared to those who died 25.6(SD 5.6) ($P<0.01$). Age greater than 29 was significantly associated with risk of dying (OR 3.29; 95% CI 1.18-9.12). Six (15.8%) were housemaids among those who died compared with 3(2.8%) of the

survivors. Being a housemaid (OR 6.63, 95%CI 1.36-35.15) and multiparity (OR 5.93, 95% CI 1.13-34.00) were significantly associated with a higher risk of death. Multivariate analysis showed that both age greater than 30 years (OR 4.15, 95% CI 1.11-15.5) and multiparity (OR 2.55, 95% CI 1.05-6.02) were independent risk factors for dying.

Table 1- Sociodemographic characteristics of eclamptic admissions to the SICU, Tikur Anbessa Hospital, Addis Ababa, Ethiopia, 1995-2004.

Variable	Deaths		Survivors		Total	
	Number	%	Number	%	Number	%
Age(Years)						
15 – 19	5	13.1	36	33.0	41	27.9
20 – 24	9	23.7	31	28.4	40	27.2
25 – 29	13	34.2	30	27.5	43	29.3
30 – 34	9	23.7	9	8.3	18	12.2
35 - 39	2	5.3	3	2.8	5	3.4
Total	38	100.0	109	100.0	147	100.0
Address						
Addis Ababa	29	76.3	84	77.1	113	76.9
Out of Addis Ababa	9	23.1	25	22.9	34	23.1
Total	38	100.0	109	100.0	147	100.0
Occupation						
House Wife	17	44.7	70	64.2	87	59.2
Student/lives with family	3	7.9	7	2.8	10	6.8
Daily laborer	1	2.6	4	3.7	5	3.4
Government employed	3	7.9	2	1.8	5	3.4
House maid	5	13.2	3	2.8	8	5.4
Private employed	1	2.6	3	2.8	4	2.7
Unemployed (lives with boyfriend)	0	0	3	2.8	3	2.0
Unknown	8	21.1	17	15.6	25	17.0
Total	38	100.0	109	100.0	147	100.0
Marital Status						
Married	23	60.5	79	72.5	102	69.4
Single	10	26.3	18	16.5	28	19.0
Unknown	5	13.2	12	11.0	17	11.6
Total	38	100.0	109	100.0	147	100.0

Table 2- Possible risk factors associated with maternal mortality among eclamptics admitted to the SICU of Tikur Anbessa Hospital, Addis Ababa, Ethiopia, 1995-2004.

Possible risk factor:	Cases		Controls		Significance		Odds Ratio	95% CI
	Number	%	Number	%	χ^2	p-value		
Age \geq 30 years	11/38	28.9	12/109	11.0	6.9	<0.05	3.29	1.19 to 9.12
Being House maid	5/30	16.7	3/92	3.3	6.64	<0.05	5.93	1.13 to 34.15
Multiparity	18/37	48.6	24/108	22.2	9.4	<0.05	3.32	1.40 to 7.87
Lateralization at admission	6/32	18.8	5/104	4.8	6.40	<0.05	4.57	1.12 to 19.04
Secondary Diagnosis for admission to SICU								
Respiratory Complications	23/38	60.5	41/109	37.6	6.02	<0.05	2.54	1.12 to 5.82
Neurologic	23/38	60.5	30/109	27.5	13.31	<0.05	4.04	1.74 to 9.45
Neurologic Diagnosis at admission to SICU								
Oliguria in SICU	11/38	28.9	9/109	8.3	10.3	<0.05	4.53	1.54 to 13.44
	15/32	46.9	12/99	12.1	17.9	< 0.05	6.40	2.33 to 17.86

Table 3 indicates the main obstetric profile and other clinical parameters of patients. Twin delivery rate was 18(12.2%) of the total. 45(30.6%) of the patients had no antenatal care. No significant association was detected between antenatal attendance and twin delivery with a higher risk of death. Premonitory symptoms were documented in 95(64.6%) of the total with 34(35.8%) having at least one; 41(43.1%) had two or three symptoms while 20(21.1%) had none. Onset of convulsions were antepartum in 102(69.4%), intrapartum in 23(15.6%) and postpartum in 22(15.0%).

The maximum mean systolic and diastolic blood pressures of the total cases were 175.4 mmHg and 118.8mmHg respectively. The maximum mean systolic blood pressures among those who died and survived were 181.7mmHg and 173.0 mmHg respectively. The maximum mean diastolic blood pressures among those who died and survived were 119.7 and 118.4 mmHg, respectively. There was no statistically significant difference in the maximum mean systolic and diastolic blood pressures of the cases and controls. Lateralizing signs were present in 11(7.5%) of the patients at hospital

admission; 6(18.8%) of those who died compared to 5(4.8%) of survivors. Presence of lateralizing signs was significantly associated with a risk of dying (OR 4.57; 95% CI 1.12-19.04).

Immediate reasons for transfer to SICU included respiratory complications 64 (43.5%); neurologic complications 53 (36.1%); uncontrolled convulsions 32 (21.8%); acute renal failure 23 (15.6%); providers conviction for need to critical care 26 (17.7%) and uncontrolled hypertension in 18(12.2%). Respiratory complications included aspiration, hospital acquired pneumonia, respiratory failure, pulmonary oedema and adult respiratory distress syndrome. Neurologic complications encountered were prolonged coma, blindness, brain death and possible intracranial hemorrhage. The presence of neurological complications (OR 4.04; 95% CI 1.74-9.45) and respiratory complications (OR 2.54; 95% CI 1.12-5.82) were significantly associated with risk of dying compared to other admission diagnosis. Twenty six (19.8%) of total patients had oliguria; 15 (46.9%) of them died compared to

11(12.1%) who survivors. Presence of oliguria was significantly associated with mortality risk (OR 6.4; 95% CI 2.33-17.86).

Main interventions undertaken at the SICU included mechanical ventilation for 90(61.2%); central venous pressure monitoring for 36(24.5%) and dialysis for 2. One hundred and nine (74.1%) of the total patients admitted were transferred to the wards improved while 38(25.9%) died at the SICU (case-fatality rate). Thirteen (34.2%) of the deaths were admitted in a moribund state with evidences of brain death making the corrected case fatality rate in SICU 25 (18.7%). The mean duration of stay in the SICU was four days and nineteen hours. The commonest causes of death were multiple organ failure 24(63.2%), neurologic complications in 18(47.4%) and respiratory failure in 12(31.6%). Other causes included shock in 9(23.7%), acute renal failure 8 (21.1%), cardiopulmonary arrest 8(21.1%) and anesthesia complications in 4(10.5%).

Table 3- Main obstetric profile and clinical data of eclamptics admitted to the SICU at Tikur Anbessa Hospital, Addis Ababa, Ethiopia, 1995-2004.

Variable	Deaths		Survivors		Total	
	Number	%	Number	%	Number	%
Parity						
Primigravida	19	50.0	84	77.1	103	70.1
1 – 5	16	42.1	23	21.1	39	26.5
≥ 6	2	5.3	1	0.9	3	2.0
Unknown	1	2.6	1	0.9	2	1.4
Total	38	100.0	109	100.0	147	100.0
ANC Booking						
Booked	25	65.8	64	58.7	89	60.5
Not booked	6	15.8	399	35.8	45	30.6
Unknown	7	18.4	6	5.5	13	8.8
Total	38	100.0	109	100.0	147	100.0
Gestational age						
Term	13	34.2	50	45.9	63	42.9
Preterm (34 – 36 weeks)	11	28.9	29	26.6	40	27.2
Remote from term (28 – 33)	5	13.2	13	11.9	18	12.2
Abortion (< 28 weeks)	7	18.4	6	5.5	13	8.8
Post term	1	2.6	2	1.8	3	2.0
Unknown	1	2.6	9	8.3	10	6.8
Total	38	100.0	109	100.0	147	100.0
Pregnancy						
Single	31	81.6	95	87.2	126	85.7
Twin	4	10.5	14	12.8	18	12.2
Unknown/Undelivered	3	7.9	0	0	3	2.0
Total	38	100.0	109	100.0	147	100.0
Number of convulsions before admission to SICU						
1 – 5	17	44.7	43	39.5	60	40.8
6 - 10	7	18.4	19	17.4	26	17.7
Repeated (≥ 11)	10	26.3	37	33.9	47	32
Unknown	4	10.5	10	9.1	14	9.5
Total	34	100.0	99	100.0	133	100.0

Discussion

Utilization of SICU services for eclamptics progressively increased over the years indicating increased awareness of health professionals of the comparative advantages in outcome. The higher risk of death noted in women older than 30 years of age and the multipara, is possibly due to delayed health seeking behavior due to possibly uneventful previous birth experiences or decrement in physiologic reserves as age advances. Older age and multiparity were independently associated with the risk of dying agreeing with other authors that while primigravidity may be the most important risk for the development of preeclampsia, multiparity is the risk associated with higher maternal mortality. Low socio economic groups such as housemaids had higher mortality most likely due to being uneducated, underprivileged, likely to have unwanted pregnancy and being late to seek medical attention. A significant number 30.6% had no antenatal care contributing to late presentation and a high case fatality rate. Presence of lateralizing signs and neurologic involvement such as deep

prolonged coma was associated with poor outcome indicating that the prognosis of patients with cerebral involvement is poor. Lack of computerized tomography or magnetic resonance imaging studies to identify the specific cause of coma and neurologic complications and institute appropriate therapy may be responsible for the poor outcome. This deficiency is noted to be a serious limitation to critical care of eclamptics at the hospital.

Several limitations in quality of critical care provision were noted. Important laboratory investigations were not recorded and possibly not determined including urinary protein in 18.4%, hematocrit in 4.7%, blood group in 14.3%, platelet count in 46.9% and renal/liver function tests in 34%. This may be due failure to consider performing these tests, poor recording but most likely are because of failure of the patient to afford the costs or inadequate supply of reagents by the hospital. Only 24.5% of the patients had CVP monitoring and only two out of eight women who required dialysis actually obtained the service indicating

that a significant proportion of the women may not have received the necessary critical care they required due to lack of facilities and manpower. This fact *per se* may have contributed to mortality risk.

The unavailability of magnesium sulphate for convulsion control may also contribute to poor outcome due to its documented superiority over diazepam in the management of eclampsia. This is one aspect of the management requiring urgent attention. Both the gross and corrected case fatality rates are markedly high. Being the only referral hospital for SICU care, this may not be surprising since critical and complicated patients are referred from other hospitals. Scarce resources and manpower, delay in referral and suboptimal SICU care are potentially responsible for this very high figure.

Early referral for SICU care of older women, the multipara, those with pulmonary and neurologic complications and those of low socioeconomic group

may improve survival. The study has also shown that the quality of SICU care is often lacking in essential facilities which need to be addressed. Establishment of a dedicated obstetric high dependency unit (HDU) or ICU is highly desirable for early detection and management of complications of eclampsia. Although all mothers with eclampsia deserve ICU care, provision of such services will be impossible in the near future in low-resource settings in Africa. Till that is possible, using selective criteria such as mothers with the above mentioned risk factors for admission to SICU may be one approach for effectively utilizing the limited resources. As this study is retrospective and of small sample size, conducting a larger study to better clarify risk factors for mortality following eclampsia requiring ICU care is recommended. Such a study will help in outlining indicators useful in identifying eclamptics who would benefit from early referral for intensive care.

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