

# Causes of Admission and out Comes among Preeclampsia and Eclampsia Mothers Admitted to Jimma University Specialized Hospital Intensive Care Unit

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**Abstract:** Background: Preeclampsia is a multisystem hypertensive disorder of pregnancy with new onset after 20 weeks gestation which is a leading cause of worldwide maternal and fetal morbidity-mortality. Objective: To assess causes of ICU admission and outcomes among pre-eclampsia and eclampsia mothers admitted to Jimma University Specialized Hospital. Methods: A retrospective cross sectional study was conducted at JUSH from May 3 to 8, 2015, all ICU admitted preeclampsia and eclampsia mother's records from January 1, 2010 to December 31, 2014 were included by consecutive sampling with inclusion and exclusion criteria. Causes of admission, complications and outcomes were obtained from patient records and analyzed by SPSS version 16.0, finally the results presented using simple frequency tables and figures. Chi square ( $\chi^2$ ) test calculated to analyze the statistical association between patients outcome and other variables, p-value less than 0.05 was considered statistically significant. Result: A total of 1981 patients admitted to Jimma University specialized hospital ICU over the last five years (January 1, 2010 to December 31, 2014) from this 326 of them were preeclampsia and eclampsia mothers and this gives admission rate of 16.5%. For this study only total of 314 preeclampsia and eclampsia mothers records were used and 12mothers cards were excluded by exclusion criteria. The main causes of admission to ICU were eclampsia 106 (33.8%), General condition need close observation 77(24.5%), pulmonary edema 63 (20.1%), postoperative bleeding 31(9.9%) While the main complications were pulmonary edema 82(26.1%), acute renal injury 76(24.2), HELLP syndrome 57(18.2%) and mortality rate of 7.3%. There is association level of blood pressure with maternal outcomes. Conclusion: Rate of maternal admission, complications and mortality is found to be high at JUSH ICU, Jimma University with other stakeholders has to work in improving high quality of cares provided to reduce maternal complications and mortality.

**Keywords:** Intensive Care, Preeclampsia, Eclampsia, Admission, Complications

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## 1. Introduction

Hypertension remains a relatively common medical complication of pregnancy with related disorders affecting up to 12% of cases. Unlike others, obstetric patients pose a major management challenge to ICU physicians and obstetricians due to altered physiology during pregnancy, consideration of fetal wellbeing, and the unique type of disorders to be dealt with (1,2)

Although pregnancy is usually a natural process that proceeds without complication, approximately 0.1–0.9% of pregnant women will develop critical illness requiring intensive care (3). Obstetric admissions to the intensive care unit (ICU) and maternal mortality continue to have a

significant impact on maternal health care, despite the low rate of such admissions in developed countries (4). Unlike others, obstetric patients pose a major management challenge to ICU physicians and obstetricians due to altered physiology during pregnancy, consideration of fetal wellbeing, and the unique type of disorders to be dealt with (5).

Hypertension remains a relatively common medical complication of pregnancy with related disorders affecting up to 12% of cases. Eclamptic seizures may occur antenatal (38%), intra-partum (18%) or post-partum (44%) (6).

Preeclampsia is a pregnancy specific hypertensive syndrome associated with significant morbidity and mortality in mother and baby. Preeclampsia-eclampsia needs intensive care Antepartum, intrapartum as well as postpartum for

successful pregnancy outcome. Preeclampsia leads to multiorgan system involvement if appropriate timing of delivery is delayed. (7)

Pre-eclampsia is characterized by the onset of hypertension and proteinuria after 20 weeks gestation in a previously normotensive patient. Abnormal placentation releases circulating factors that cause vascular endothelial dysfunction in the mother, manifesting as hypertension and renal dysfunction (8).

Pre-eclampsia is a multisystem disease process. Two cardinal features must exist in order to make the diagnosis: Presence of sustained hypertension Systolic blood pressure >140 mmHg, Diastolic blood pressure >90 mmHg and Proteinuria >300 mg protein in a 24-hour urine collection (9)

Severe pre-eclampsia is more likely to require critical care and is diagnosed by the presence of more severe blood pressure elevation and significant organ dysfunction. Pre-eclampsia predominantly affects the maternal cardiovascular, neurological and renal systems, but all systems are affected to a greater or lesser degree. The presence of neurological signs and symptoms tend to be indicative of severe pre-eclampsia. The more common manifestations include: Persistent headache, Visual disturbances, Hyperreflexia and Seizures (indicative of eclampsia until proven otherwise) (10).

Despite the drastic decrease in maternal morbidity over the last few decades because of improvements in obstetric care maternal mortality remains to be a challenge in the developing world. Only a few studies have been published concerning ICU admissions of obstetric patients in the developing world, in which maternal mortality rates have ranged from 28% to 60% (11, 12,13).

## 2. Method and Materials

The study was conducted at JUSH which is located 346kms from capital Addis Ababa. Jimma University specialized hospital(JUSH) is one of the oldest public hospital in the country, Currently it become the only teaching and referral hospital in the south western part of the country with bed capacity of 450 and a total of more than 750 staffs of both supportive and professional. Currently the hospital provides medical services like clinical service for approximately 9000 inpatient and 80000 outpatients. ICU department is one of the major inpatient departments that provide services for critically ill patients that accommodate 6 beds with two functioning mechanical ventilators. JUSH ICU is running by two Anesthesiologists, Anesthesiology residents, Internists, Nurses, Medical interns, Residents of surgery and Internal medicine.

Using retrospective cross sectional study from May 3 to 8, 2015 with consecutive sampling a total of 314 preeclampsia and eclampsia mothers' cards who admitted to Jimma University ICU from January 1, 2010 G.C to December 31, 2014 G.C were included by using inclusion and exclusion criteria. Causes of admission, complications and outcomes

were obtained from patient records using check list and the collected data was checked at the end of each day for their completeness, and consistency, and it was cleaned manually and analyzed using SPSS version16.0.

Chi square ( $\chi^2$ ) test calculated to analyze the statistical association between patients outcome and other variables, p-value less than 0.05 was considered statistically significant.

### 2.1. Exclusion Criteria

Mothers card which doesn't contain either of :outcome, causes of admission , ANC not documented were excluded (n=12)

### 2.2. Ethical Considerations

Before the actual data collection process, an official permission letter was obtained from Ethical committee of Jimma University, in addition the brief explanation of the study objective was given for ICU healthcare team, and record keeper workers about the objective of this study and confidentiality of patients' information.

## 3. Result

A total of 1981 patients admitted to Jimma University specialized hospital ICU over the last five years from this 326 of them were preeclampsia and eclampsia and this gives 16.5% of total admission. For this study only total of 314 preeclampsia and eclampsia mothers records were used and 12mothers cards were excluded by exclusion criteria. From the total 314 analyzed, about 208(66.2%) were sever preeclampsia and 106(32.8%) were eclamtic mothers. About 85(27.1) were between 34- 38 years age group and 66(21%) of them were between 39-43 years age group. More than half of cases 189 (60.2%) were from rural. 228 (72.6%) of them were multigravida and 86(27.4) them prim gravida. 149 (47.5) has ANC follow up, about 192(61.1) of them has admission BP of >170/110 mmhg. Majority 154(49%) have 2++ proteinuria on admission (See Table 1 below). Regarding modes of delivery 253(80.6%) by cesarean section, among them 133(52.6%) undergone C/S while in labor and 42(13.4% ) the mothers give birth by normal vaginal delivery (Table 2).

*Causes of admission:* The main causes of admission were sever eclampsia 106 (33.8%), General condition need close observation 77(24.5%), pulmonary edema 63 (20.1%), postoperative bleeding 31(9.9%) and anesthesia complications 16(5.1%) (Table 2).

*Complications and outcomes:* With the mean length of ICU stay of 7.1days and overall mortality rate of 7.3%,the major complications were pulmonary edema 82(26.1%), acute renal injury 76(24.2), HELLPsyndrome 57(18.2%) (Table 2).

## 4. Discussion

Preeclampsia is a multisystem hypertensive disorder of

pregnancy with new onset after 20 weeks gestation which is a leading cause of worldwide maternal and fetal morbidity-mortality (19).

From a total of 314 patients studied, about 85(27.1) were between 34- 38 years age group and 66(21%) of them were between 39-43 years age group. About 189 (60.2%) were from rural, 228 (72.6%) of them were multigravida and 86(27.4) them prim gravida. 149 (47.5) has ANC follow up other study conducted at Argentina has showed that ANC follow up has association with maternal outcomes (14).

Majority 192(61.1) of mothers has admission BP of >170/110 mmhg there is association between admission blood pressure of this mothers with their outcomes ( $P=0.028265$ ) this may be due to the higher and unstable blood pressure is associated with vital organ perfusion derangement as many vital organs have autoregulation to maintain their perfusion and high BP is also associated to complications like stroke, myocardial ischemia, renal, ocular problems and even death.

About 154(49%) have 2++ proteinuria on admission this proteinuria has also association with the maternal out comes ( $P=0.000361$ ) this is similar to the study finding from Spain

reported protein urea and null parity associated with maternal outcomes (15).

Regarding duration of hospital stay majority 189(60.2%) 5-10 days with mean ICU stay of 7.1 days and duration of hospital stay has strong association with mothers outcome ( $p=0.000464$ ) as the death rate among the 3-5 days is about (22.6%) and 10-15 days about (4.9%) and this shows the longer they stay the better outcome according to this study and vice versa this may be due to many factors like the patients status on admission like their vital signs, consciousness levels and degree of vital organ damage (liver, kidney CVS and lungs).

Regarding modes of delivery 80.6% of the cases were undergone cesarean section, this rate of C/S is almost similar as compared to the study done in Cameroon showed rate of C/S 44 (78.2) (16).

About 52(16.6%) of the eclampsia cases occurred during antenatal, and 13.1% occurred post-delivery and this is almost similar to the study done in Yorkshire UK retrospectively reported 55% for eclampsia cases occurred during antenatal, and 32% for cases occurred post-delivery (13).

**Table 1.** Socio demographic and maternal characteristics, among ICU admitted pre-eclampsia/eclampsia patients, JUSH, Jimma town, Southwestern Ethiopia, June 2015.

Variables	Number (Percent)
Age	<18
	23 (7.3)
	18-22
	32(10.2)
	23-27
	39(12.4)
	28-33
	54(17.2)
Address	34-38
	85(27.1)
	39-43
	66(21.0)
	≥44
	15(4.8)
	Total
	314(100)
Gravida	Rural
	189 (60.2)
	Urban
Parity	125 (39.8)
	Total
	314(100)
ANC follow up	Para gravid
	86(27.4)
	Multi gravid
Blood pressure on admission	228(72.6)
	Total
	314(100)
Proteinuria on admission	Nulliparous
	86(27.4)
	Primipara
Duration of hospital stay	97(30.9)
	Multipara
	131(41.7)
	Total
	314(100)
	Yes
	149 (47.5)
	No
	165(52.5)
	Total
	314(100.0)
	140/90 - 169/109
	122 (38.9)
	>170/110
	192(61.1)
	total
	314(100)
	2+
	58(18.5)
	2++
	154(49.0)
	3+++
	102(32.5)
	total
	314(100)
	3-5days
	35(11.1)
	5-10days
	189(60.2)
	10-15days
	81(25.8)
	>15days
	9(2.9)
	total
	314 (100.0)

**Table 2.** Modes of delivery, Causes of admission, maternal complications and outcomes, among ICU admitted pre-eclampsia/eclampsia patients, JUSH, Jimma town, Southwestern Ethiopia, June 2015.

Types of delivery method	Number ( Percent)
Cesarean section delivery	253(80.6)
Normal vaginal deliveries	42(13.4)
Operative vaginal deliveries	19(6.1)
Total	314(100)
Causes of ICU admission	Eclampsia
	106 (33.8)
	General condition requiring close observation
	77(24.5)
	Pulmonary edema
	63 (20.1)
Maternal complications and out comes	Postoperative bleeding
	31(9.9)
	Anesthesia complications
	16(5.1)
	Ventilator problem
	21(6.6)
	Pulmonary edema
	82(26.1%)
	Acute renal injury
	76 (24.2)
	HELLP syndrome
	57 (18.2%)
	Coagulation problem(requiring factor transfusion)
	43(13.7%)
	Thromboembolism
	23(7.3%)
	Coma
	21(6.7%)
	Stroke
	9(2.9%)
	Visual problem
	4(1.3%)
	Death
	23(7.3)

**Table 3.** Factors associated with maternal outcomes, among ICU admitted pre-eclampsia/eclampsia patients, JUSH, Jimma town, Southwestern Ethiopia, June 2015.

Variables		Outcomes						P-value
		Improved		Death		Total		
		No.	%	No.	%	No.	%	
Age	<18	20	86.9	3	13.1	23	7.3	NA
	18-22	28	87.5	4	12.5	32	10.2	
	23-27	35	89.7	4	10.3	39	12.4	
	28-33	49	90.7	5	9.3	54	17.2	
	34-38	81	95.2	4	4.8	85	27.1	
	39-43	64	96.9	2	2.1	66	21.0	
	≥44	14	93.3	1	6.7	15	4.8	
	Total	291	92.7	23	7.3	314	100	0.9449
Address	Rural	175	92.6	14	7.4	189	60.2	
	Urban	116	92.8	9	7.2	125	39.8	
Total	291	92.7	23	7.3	314	100	0.4088	
Gravida	Primi gravid	78	90.7	8	9.3	86		27.4
	Multi gravid	213	93.4	15	6.6	228		72.6
Total	291	92.7	23	7.3	314	100	0.17414	
Parity	Nulliparous	82	95.3	4	4.7	86		27.4
	Primipara	86	88.7	11	11.3	97		30.9
	Multi para	123	93.9	8	6.1	131		41.7
Total	291	92.7	23	7.3	314	100	0.1561	
ANC follow up	Yes	133	94.8	7	5.2	140		44.5
	No	158	89.9	16	10.1	174		55.4
Total	291	92.7	23	7.3	314	100.0	0.0282	
Blood pressure on admission	140/90 - 169/109	118	96.7	4	3.3	122		38.9
	170/110	173	90.1	19	9.9	192		61.1
total	291	92.7	23	7.3	314	100	0.0003	
Proteinuria on admission	2+	57	98.3	1	1.7	58		18.5
	2++	148	96.1	6	5.9	154		49.0
	3+++	86	84.3	16		102		32.5
total	291	92.7	23	7.3	314	100	0.1711	
Timing of eclampsia cases	Caesarean section	234		19		253		80.6
	Normal deliveries	41		1		42		13.4
	Operative vaginal deliveries	16		3		19		6.1
Total	291	92.7	23	7.3	314	100	0.0073	
Timing of eclampsia cases	Antenatal	46		6		52		16.6
	Before admission to maternity unit	81	90.0	9	10.0	90		28.7
	In labor/delivery	129	98.5	2	1.5	131		41.7
Duration of hospital stay	Post delivery	35	85.4	6	14.6	41	13.1	0.0004
	Total	291	92.7	23	7.3	314	100	
	3-5days	27	77.4	8	22.6	35	11.1	
	5-10days	180	95.2	9	4.8	189	60.2	
	10-15days	77	95.1	4	4.9	81	25.8	0.0004
>15days	7	77.8	2	22.2	9	2.9		
Total	291	92.7	23	7.3	314	100		

Concerning causes of admission to intensive care: pulmonary edema 82(26.1%), HELLP syndrome 57(18.2%) this is higher as compared to the study conducted in Singapore reported sever eclampsia and pulmonary edema accounted for 7.7%and 14.4% respectively (17). this differences may be due to low ANC follow ups, delayed arrival and setting difference which matters a lot about the management of this cases before some of the complications arises. Other study done in Argentina showed main causes of

ICU admission were eclampsia (63; 34%), severe preeclampsia (61; 33%), HELLP (33; 18%) (14) Which is similar to this study finding in incidence of this complications and the percentage difference may be due to sample size difference between these studies.

About 26.1% women developed serious complications, of them 26.2% pulmonary edema, renal failure 24.3%, and 19.2% coagulation problems and this is higher as compared to the study conducted in Yorkshire UK reported 13.9% had serious

complications including pulmonary edema(2.3% of cases) (13). This rate of complication is much higher as compared to the study finding done in Spain in which complications rate was 14%, of which 5% acute renal failure and 2% coagulopathy)(15),this higher rate of ICU maternal complication in our setting may be due the socio economic difference, JUSH ICU is not obstetric ICU it is general ICU that all patients from all over the departments within the hospital requiring ICU admission will be admitted and it has only six beds and two functioning ventilators for all admitted cases and this is a big challenge to provide necessary cares specially ventilator support in case the two functioning ventilators used by other patients.

This study finding is lower as compared to the study done in Cameroon which showed AKI (66.7%), HELLP syndrome (45.5%) and pulmonary edema (18.2%) this may be due to the sample size (n=78vs314) difference setting difference(16) there is no dialysis and plasma exchange in our hospital setting and the complications were managed with supportive cares.

Regarding outcome- this study found maternal mortality of 7.3%, which is higher when compared with study conducted in, Spain and Hong Kong china, reported 1.5% and 6%, respectively (15,17). The study conducted at University of Maiduguri Teaching Hospital Nigeria has showed the case fatality rate for eclampsia managed in ICU was 14.65% (18).The difference may be due to the difference in socio economic status of the countries which affects quality of medical care.

## Strengths and Limitations of This Study

The strength of this study is the 5 years duration of study and large number of admitted cases studied. Furthermore, the results of this study will expectedly provide us with further knowledge on admission and outcome of preeclampsia and eclampsia patient at JUSH ICU.

The main limitations of this study include its retrospective design, single-center site, the inability to calculate population-based rates and cross sectional study is poor to show cause and outcome relationships and this study didn't explore the management of each cases.

## Conclusions and Recommendation

Rate of maternal admission, complications and mortality is found to be high at JUSH ICU, Jimma University with other stakeholders has to work in improving high quality of cares provided to reduce maternal complications and mortality.

## List of Acronyms

JUSH: Jimma University specialized hospital  
ICU: Intensive Care Unit  
HELLP syndrome: hemolysis, elevated liver enzymes and low platelet counts  
AKI: Acute kidney injury

ANC: Antenatal care

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