Prognostic Factors for Eclamptics in Intensive Cares of Two University Teaching Hospitals in Cotonou, Benin

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Abstract

Introduction: In Benin, the maternal mortality rate remains high and one of the main causes is preeclampsia in its complicated forms, including eclampsia. For this, treatment is most often provided in an intensive care unit by a multidisciplinary team involving obstetricians and intensive care doctors. **Objective:** To determine the prognostic factors of eclamptics treated in intensive care units in two university teaching hospitals in Cotonou. **Patients and Method:** The study was transversal descriptive and analytical with prospective collection of data from May 1 to July 31, 2022, in the intensive care units of CHU-MEL and CNHU-HKM in Cotonou. The sampling was non-probability with exhaustive recruitment of all cases of eclampsia managed in hospital intensive care units. Clinical, therapeutic and evolutionary data were studied. Data analysis was done with Epi info 7.2.1.0 software. **Results:** Fifty-five eclamptics were included. The incidence was 12.39%. The average age of eclamptics was 24.67 ± 1.41 years, with a reference rate of 85.45%. Primigravidae represented 52.73%. A history of eclampsia and/or high blood pressure (14.54%) was associated with mortality. Cesarean section was indicated in 85.45% and general anesthesia, was the technique used in 95.75% of cases. Eclamptic status was found in 36.37% of patients. Other poor prognostic factors were Glasgow score of less than nine (9.09%), shock (7.27%), mechanical ventilation (58.18%) and complications. Mortality was 16.36%. **Conclusion:** The mortality of eclamptics in the intensive care units of CHU-MEL and CNHU-HKM was high. Poor prognostic factors were a history of preeclamp-

sia or pregnancy-induced hypertension, severity of eclampsia and complications.

1. Introduction

Maternal mortality in Benin, like the countries of Sub-Saharan Africa, is high with a ratio of 397 per 100.000 live births according to the World Health Organization (WHO) [1]. It is less than 10 per 100.000 live births in most countries in Europe and 14 per 100.000 live births in the United States of America [1]. Pre-eclampsia is a complication of pregnancy occurring after 20 weeks of amenorrhea, linked to a placental defect responsible for generalized endothelial dysfunction and tissue lesions. Eclampsia is severe pre-eclampsia with convulsive neurological manifestations. Eclampsia is the 3rd and 2nd leading cause of maternal mortality respectively worldwide and in Benin [2] [3] [4]. In sub-Saharan Africa, the clinical expression of eclampsia is often severe, justifying its management in intensive care units. Care in an intensive care unit is provided by a multidisciplinary team involving the obstetrician and the anesthetist-resuscitator doctor. Eclampsia is associated with high morbidity and mortality in African intensive care units [3]. With the aim of improving the management of eclamptics in intensive care and contributing to the reduction of maternal mortality, we initiated this study whose main objective is to determine the prognostic factors of eclamptics admitted to the intensive care units of the Hubert Koutoukou Maga National Hospital Center (CNHU-HKM) and the Lagune Mother and Child University Hospital Center (CHU-MEL).

2. Patients and Method

This was a cross-sectional, descriptive and analytical study, carried out in the intensive care units of CHU-MEL and CNHU-HKM in Cotonou. Data were collected prospectively over a period of three months (May 1 to July 31, 2022). The sampling was non-probability with exhaustive recruitment of all cases of eclampsia which were admitted in the intensive care units of the two centers during the study period.

Eclampsia was defined by the presence of:
- Albuminuria ≥ ++ on urine dipstick;
- Generalized or non-generalized tonic-clonic convulsion;
- Arterial hypertension defined as (PAS ≥ 140 mmHg and/or PAD ≥ 90 mmHg).

The medical records of eclamptic patients admitted to intensive care were used to discuss the diagnosis. A systematic biological work-up was requested: albuminuria, liver and kidney function tests, haemostasis, haemogram. Haptoglobin, LDH and schizocyte count were not performed due to limited technical re-

sources. Data was collected from medical records, patient surveillance and therapeutic records, using a pre-established survey form. The data studied were sociodemographic, clinical (comorbidities, clinical state on admission to intensive care), therapeutic (mode of delivery, anesthesia management and medical management of eclampsia) and evolutionary data (evolution and the future of patients).

The data collected were processed and analyzed with the EPI info software version 7.2.1.0. The quantitative variables were presented in the form of mean and standard deviation and the qualitative ones in the form of frequency. Tables and figures were designed with Excel 2013. Chi2 tests were used to determine associations between patient variables. The significance threshold was set at 5% (*i.e.* 0.05).

Ethical and deontological aspects

The anonymity of the patients and the confidentiality of the data were respected.

3. Results

3.1. Incidence of Eclampsia

A total of fifty-five (55) cases of eclampsia were included out of four hundred and forty-four (444) patients hospitalized in the intensive care units in the two hospitals, a rate of 12.39%.

3.2. Sociodemographic Data

The average age of eclamptics was 24.67 ± 1.41 years. The median was 23 years with the extremes of 15 and 38 years.

In most cases (85.45%), eclamptics had been referred from another hospitals for a proportion of 14.55% of patients who came by themselves. Primigravidae represented 52.73%. The prenatal consultation was carried out at least four times in thirty-four eclamptics, or 61.82% of cases.

Table 1 represents the sociodemographic data of eclamptics.

3.3. Clinical Data

Medical history

No medical history was identified in forty-nine eclamptics or 89.09%. Pregnancy-related hypertension and eclampsia were found as medical histories in three (5.45%) and five (9.09%) patients respectively.

Clinical condition of eclamptics

Eclampsia occurred antepartum in forty patients (72.73%). Admission in intensive cares occurred within twenty-four hours following eclampsia in forty-eight patients (87.27%).

Neurologically, it was eclamptic status in twenty patients (36.37%) and four (9.09%) of them had a Glasgow score less than 9.

On the cardiovascular level, twenty-seven patients (49.09%) had a systolic blood pressure greater than 160 mm Hg and nine (16.37%) a diuresis less than

Table 1. Sociodemographic data of eclamptics in intensive cares of CHU-MEL and CNHU-HKM in 2022.

Caracteristics	Numbers (N = 55)	Percentages (%)
Age (years)		
<18	03	05.45
18 - 35	50	90.91
>35	02	03.64
Gesture		
Primigravidae	29	52.73
Paucigest	15	27.27
Multigesture	07	12.73
Great multigeste	04	07.27
Parity		
Primiparous	32	58.18
Pauciparous	14	25.45
Multiparous	05	09.09
Great multiparous	04	07.27

0.5 ml/kg/hour. Arterial oxygen saturation was less than 95% in four eclamptics (7.27%).

We present in Table 2 the clinical condition of eclamptics upon admission.

3.4. Paraclinical Data of Eclamptics

Severe anemia < 7 g/dl and severe thrombocytopenia < 50.000/mm^3 were found respectively in four (7.27%) and five (9.09%) eclamptics. Cytolysis with AST > three times normal was found in eight eclamptics (14.54%). Acute kidney injury with serum creatinine > 1.5 times normal was also noted in eight (14.54%) other eclamptics.

Haptoglobin, schistocytes and LDH had not been performed.

The Table 3 represents the biological disturbances found upon admission of patients in intensive care.

3.5. Therapeutic and Evolutionary Data

Caesarean section was the main mode of delivery in forty-seven eclamptics (85.45%). General anesthesia with rapid sequence induction was the anesthesia technique in 95.75% of cesarean patients.

All eclamptics were placed on the magnesium sulfate protocol. Noradrenaline was used in four of the eclamptics who were shocked (7.27%). Mechanical ventilation was indicated in thirty-two eclamptics or 58.18%. Labile blood products (concentrated red blood cells and fresh frozen plasma) were administered to twenty-two (40%) eclamptics of whom four (7.41%) had been transfused with platelets.

Table 2. Initial clinical status of eclamptics in intensive care units of CHU-MEL and CNHU-HKM.

Visceral failures	Number (N)	Percentages (%)
Type of seizures		
Isolated crisis	17	30.90
Repeated crisis	18	32.73
Convulsive status	20	36.37
Glasgow score		
<8/15	05	09.09
8 - 12	30	54.55
>12	20	36.36
Systolic blood pressure (SBP)		
Collapse or low blood pressure (SBP < 90 mmHg)	04	07.27
Normal	02	03.64
Mild hypertension (140 - 159)	22	40.00
Moderate hypertension (160 - 179)	20	36.36
Severe hypertension (≥180)	07	12.73
SaO$_2$		
90 - 95	04	07.27
>95	51	92.73
Diuresis (ml/kg/h)		
<0.3	01	01.82
0.3 - 0.5	08	14.55
>0.5	46	83.64

Table 3. Biological disturbances found upon admission of patients in intensive care units.

Biology report	Number (N)	Percentages (%)
Hemoglobin level (g/dl) (N = 51)		
≥11.5 (Normal)	12	23.52
7 - 11.5 (Moderate anemia)	35	63.63
<7 (Severe anemia)	04	07.27
Number of platelets (G/L) (N = 47)		
≥150 (Normal)	28	50.90
100 - 149 (Mild thrombocytopenia)	12	21.81
50 - 99 (Moderate thrombocytopenia)	02	03.63
<50 (Severe thrombocytopenia)	05	09.09

Continued

Renal assessment (Serum creatinine) (N = 44)		
Normal (6 - 12 mg/l)	36	66.67
1.5 times normal	03	05.56
2 times normal	02	03.70
3 times normal	03	05.56
AST (UI/L) (N = 35)		
Normal (<50)	19	34.54
Mild cytolysis (<2 times normal)	07	22.72
Moderate cytolysis (2 to 3 times normal)	01	01.81
Important cytolysis (≥3 times normal)	08	14.54
Prothrombine ratio (PR)		
Normal (≥70%)	08	14.55
Disturbed (<70%)	13	23.64
Not performed	34	61.82
Total	55	100

Renal function was severely degraded in three patients (5.56%) who had received hemodialysis.

The length of stay was on average 4.27 ± 1.27 days.

Nine eclamptics died during hospitalization, giving a mortality rate of 16.36%.

Complications that occurred in patients during their stay in intensive care are shown in Table 4.

3.6. Factors Associated with Mortality

To identify the factors associated with eclamptic mortality, we carried out a univariate analysis, increasing the independent variables with mortality. Table 5 shows the associations of variables with mortality. History of pregnancy-induced hypertension or preeclampsia, need for norepinephrine, severity of initial neurological condition, and occurrence of complications during intensive care stay were associated with mortality. Table 4 represents the factors associated with mortality after crossing the variables.

4. Discussion

We carried out a cross-sectional and descriptive study among eclamptics admitted in intensive care units over a period of three months. The limited study period did not allow us to obtain a larger sample that would give more power to our study. But the data was collected prospectively, which made our results more reliable. The objective of our work was to study the prognostic factors of eclampsia in the intensive care units of CHU-MEL and CNHU-HKM.

Table 4. Distribution of patients according to maternal complications during hospitalization.

Complications	Effective	Percentage (%)
None complications	37	67.27
Renal failure	11	20.00
Stroke	6	10.91
Acute pulmonary edema	2	3.64
Status epilepticus	2	3.64
Sepsis	2	3.64
HELLP syndrom	7	12.72

Table 5. Factors associated with death in eclamptics in intensive care.

	Death		p-Value	OR	IC 95% [OR]
	Yes	No			
Hystory of preeclampsia or pregnancy hypertension					
No	05	42	0.018	1	
Yes	04	04		8.40	1.59 - 44.51
Glasgow score					
<8/15	03	02		11	1.51 - 79.84
8 - 12	04	26	0.048	0.61	0.146 - 2.59
>12	02	18		0.44	0.08 - 2.38
Noradrenaline					
No	06	44	0.027	1	
Yes	03	02		11	1.52 - 79.84
Complications					
No	08	10	0.0002	1	
Yes	01	36		0.035	0.004 - 0.311

4.1. Incidence of Eclamptics in Intensive Care

Eclamptics admitted in intensive care units were those who had presented vital distress. The incidence was 12.39%, a relatively high frequency which could be linked to a very high rate (96.36%) of referral of eclamptics from peripheral health centers to the two hospitals, to an insufficient monitoring of risky pregnancies (38.18% of eclamptics had less than four prenatal consultations). Our results were comparable to those of work carried out in Dakar by Bah AO *et al.* [5] in 2000, Békoin-Abhé *et al.* [6] in 2018 in Ivory Coast, who reported incidences of 10.37% and 12.1% respectively. The incidence in our study was higher than those of the studies carried out in Benin by Adisso *et al.* in 2006 at CHU

Parakou (0.76%) [3], Ditrinou *et al.* in 2007 at CNHU-HKM (2.98%) [4], Ahounou *et al.* in 2017 at CHUD-OP (5.5%) [5]. It was much lower than the incidence in the work of Moukoro P *et al.* (21.52%) [7].

4.2. Socio-Demographic, Clinical and Biological Data of Eclamptics

The study population was young as confirmed by the average age which was 24.67 ± 1.41 years. Extreme ages, under eighteen and over thirty-five, are known to be risk factors for preeclampsia [8]. Five eclamptics in our population were found in these age intervals. Our results were comparable to those of several African authors, such as Thiam L *et al.*, Diouf *et al.*, and Buambo-Bamanga *et al.*, who found an average age of eclamptics, respectively 25 years, 24 years and 22 years [8] [9] [10].

The clinical profile of eclamptics in our study was that of a young woman in a moderate to severe coma (63.64%), who presented repeated convulsive attacks (32.73%) or eclamptic status epilepticus (36.37%), who was placed on mechanical ventilation (40%), in a precarious hemodynamic state, treated with blood transfusion (40%) and noradrenaline (9.09%). In the work of Baye S *et al.*, the frequency of comas (92.1%) [11] was significantly higher than ours. Elombila M *et al.*, reported in their work on severe eclampsia, a need for mechanical ventilation of 4.2% [12], a rate ten times lower than our results. This disparity is linked to the fact that our study population consists only of eclamptics admitted to intensive care, which is not the case in the work of Elombila M *et al.*

4.3. Prognostic Factors

A history of pre-eclampsia and/or pregnancy-related hypertension increases the risk of severe pre-eclampsia sevenfold [13] [14]. These two risk factors were associated with mortality in our study (p = 0.01). Yancey *et al.*, Sibaï *et al.*, obtained the same results in their work [15] [16]. It is therefore important to implement a monitoring policy in level 3 maternity wards for women with a history of pre-eclampsia or pregnancy-related hypertension in order to reduce maternal mortality. Furthermore, the severity of eclampsia marked by a severe alteration of the state of consciousness (p = 0.02), hemodynamic instability (p = 0.02), the occurrence of complications (p = 0.0002), was associated with mortality and constituted a poor prognosis factor for eclamptics in the intensive care units of both hospitals. Reducing maternal mortality linked to eclampsia will therefore require the implementation of at least four prenatal consultations recommended by the WHO, the establishment of a compulsory anesthetic consultation for all pregnant women, the recommendation to refer early, towards a level 3 maternity ward, any pregnant woman diagnosed with pre-eclampsia, the recruitment of anesthetists and the opening of a position of anesthetist in any level 3 maternity unit, the improvement of the technical platform for intensive care in hospitals in Benin and the free healthcare or the establishment of universal health insurance for all pregnant women.

5. Conclusion

The mortality of eclamptics in the intensive care units of CHU-MEL and CNHU-HKM is high. The history of pre-eclampsia or pregnancy-related hypertension, the severity of eclampsia and complications were poor prognosis factors.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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