Research Article

Eclampsia in African Milieu, Yaounde-Cameroon: epidemiology, seasonal variations and treatment regimen

Abstract

Background: In our context, eclampsia is a major cause of maternal death. Patients are often sent to referral hospitals for optimal care because of the scarcity of resources in peripheral health facilities. We study characteristics of eclampsia the Yaounde Gynaeco-Obstetric and Paediatric Hospital (YGOPH) in order to prioritize our resources.

Methodology: We carried out a retrospective cross-sectional descriptive study from December 2017 to April 2018 at YGOPH. All women managed for eclampsia over the preceding 10 years, from May 1st 2008 to April 30th 2018, were included in the study. We evaluated the seasons of disease occurrence, socio-demographic and clinical characteristics on admission and treatment regimen. We analysed our data using Epi info 7.0.

Results: The frequency of eclampsia was 0.96% (151/25680). The mean age of patients was 23.95±6,02 years. Singles (73.5%), housewives (40.4%) and nulliparous patients (54.9%) were the most represented. The disease occurred more frequently during the major rainy season (43.7%). Patients were most often referred cases (70.2%). Eclampsia occurred mostly antepartally (70.3%). Hypertension was most often severe (83.45%). Nicardipine was the most used antihypertensive medication (76.8%) and magnesium sulphate was the anti-convulsant of choice (98.0%). The majority of women delivered by caesarean section (77.8%). HELLP syndrome was the most common maternal complication (9.9%), while prematurity was the most frequent fetal complication (58.9%). The maternal and neonatal mortality rates were 8.6% and 24.4%, respectively.

Conclusion: Eclampsia remains an important cause for concern as it results in non-negligible morbidity and mortality. It is therefore important to promote and reinforce antenatal care for pregnant women while taking into consideration the seasonal variations of the disease.

Keywords: eclampsia, epidemiology, seasonal variations, Yaounde, Cameroon

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Introduction

Eclampsia refers to the occurrence of one or more seizures and/or altered consciousness before, during and after birth irrespective of known preeclampsia. These seizures cannot be attributed to any preexisting neurological deficits.[1] It is a major complication of hypertensive disease in pregnancy and its pathophysiology is not fully understood. According to literature reviews, frequencies differ across countries. In developed countries, eclampsia is a rare occurrence with a global frequency of 4.9 per 100,000 births.[2] The highest incidences are reported in resource-limited countries.[3,4] In sub-Saharan Africa, its incidence varies between 9 and 34 per 1000 livebirths with very high maternal and perinatal mortality rates.[4–7] In Cameroon, Priso et al.,[8] in 2009 reported an eclampsia frequency of 1/105 deliveries.[8]

Recent reproductive health data revealed that hypertensive diseases in pregnancy are still one of the main causes of maternal death,[9–11] and eclampsia is one of the worst outcomes of hypertensive diseases of pregnancy because of its unpredictable evolution as well as its potentially severe complications. Maternal deaths due to preeclampsia result mainly from eclampsia.[12] Despite improvements in the management of the disease, it is still associated with a maternal mortality rate of 2.81 to 38.9%, and a perinatal mortality between 12.5 and 31.5%.[1,13–15]

Eclampsia and other hypertensive diseases of pregnancy are the first cause of maternal mortality in our hospital.[16] In addition, difficulties in management in our setting are prevalent, due to poor socioeconomic status of patients and provision of substandard care.

The epidemiological profile of hypertensive disease in pregnancy described in literature reveals a young woman aged between 15-25 years, nulliparous with poor quality antenatal care.[7,8,17] Environmental factors have been identified as precursors to the occurrence of eclampsia. Among these, seasonal changes have usually sparked some debate. Diouf et al.[17] in Senegal in 2013 described increased frequencies of the condition during cold periods (October-December).[17] This was yet unrevealed by studies in Cameroon. The low prevalence of eclampsia in developed countries is due to the capacity of their healthcare systems to detect hypertensive diseases in pregnancy early, thereby preventing their complications. For substandard healthcare systems like ours with lack of funding and poor infrastructure, observed seasonal variations and peaks of that complication can guide the channelling of limited resources appropriately, such that during high seasons, the necessary materials for optimal management of the disorder are prioritized, especially when drug availability is a limiting factor for adequate management.

The aim of this study was to assess the seasonal variations in the

incidence of eclampsia and its clinical presentation in our hospital in a bid to better manage its morbidity, and thus reduce eclampsia related maternal mortality.

Patients and methods

We carried out a cross-sectional descriptive and retrospective study over 5 months, spanning December 2017 to April 2018 in the Obstetrics and Reanimation units of Yaounde Gynaeco-Obstetrics and Paediatric Hospital (YGOPH). This hospital is one of the two tertiary care hospitals of the capital of Cameroon and specializes in paediatrics, and obstetrics/gynecology. Cameroon is a low-income country in central Africa with more than 20 million inhabitants. All women admitted for eclampsia between May 2008 and April 2018 with complete medical records were included. We obtained their information from admission and delivery registers, postoperative reports and patient files. The information was entered into pre-established data collection sheets. We defined eclampsia as a seizure and/or altered consciousness occurring within a known context of preeclampsia and not linked to any other pre-existing neurological deficits.[1] We defined preeclampsia as raised blood pressure with a systolic value over 140mmHg or a diastolic value over 90mmHg after the 20th week of pregnancy, and associated proteinuria equal or greater than 300mg/24h or +1 or more on urine dipsticks.[18] Sampling was consecutive and exhaustive. Gestational hypertension was raised blood pressure with a systolic value over 140mmHg or a diastolic value over 90mmHg without proteinuria. We included all patients diagnosed and managed for eclampsia before delivery and up to 42 completed day's post-partum. Only patients with documented positive proteinuria were retained for the study. Pregnant women who presented with seizures without raised blood pressures according to the above definition and proteinuria were excluded. Incomplete files were also excluded.

We obtained ethical clearance from the institutional Research and Ethical Committee (CIER) of the Yaounde Gynaeco-Obstetric and Paediatric Hospital (HGOPY). Variables of interest were the patients' socio-demographic characteristics (age, marital status, profession), the months and seasons in which eclampsia occurred, patients' clinical characteristics (number of pregnancies (gravidity), number of deliveries at term (parity), preterm birth (birth before 37 completed weeks of pregnancy), abortions (termination of the pregnancy during the first 22 weeks), live children, past history of preeclampsia, eclampsia and gestational hypertension, gestational age at admission, intergenesic interval and age of the relationship). In addition, we noted their past medical history (hypertensive disease, diabetes, renal disease, cardiomyopathy, auto-immune disease), drug use (tobacco, alcohol), their clinical presentation on admission (convulsions, headaches, visual disturbances, epigastric pain, vertigo, anuria, level of consciousness, the time of occurrence of the crisis with respect to delivery, mode of admission and foetal outcome), the treatment regimen (pharmacological and non-pharmacological means, mode of delivery) and the prevalent complications. There are four seasons in Cameroon: two rainy seasons and two dry seasons. The major dry season spans from November to February, the major rainy season from March to June. The minor dry season runs from July to August and the minor rainy season from September to October. We recorded the month of eclampsia occurrence to determine the season concerned. Our data were analysed using Epi info 7.0 and Microsoft Word® 2016 software. Qualitative variables were represented as frequency tables. Quantitative variables were expressed as means and standard deviations.

Results

Study population and frequency of eclampsia

During our study period, 247 cases of eclampsia were admitted at YGOPH for 25,680 deliveries giving a frequency of 0.96%. Out of the 177 patient files found, 26 were excluded, leaving a sample size of 151 patient records retained for the study. The highest frequency of eclampsia, over the 10-year period, was in 2013, with a yearly frequency of 15.9% (Table 1).

Table 1 Patients' distribution of eclampsia occurrence per year

Years	Number N=151	Frequency (%)
2008	8	5.3
2009	14	9.4
2010	7	4.6
2011	8	5.3
2012	10	6.6
2013	24	15.9
2014	9	5.9
2015	15	9.9
2016	16	10.6
2017	19	12.6
2018	21	13.9

Socio demographic characteristics

Table 2 presents the socio-demographic characteristics of the patients. The mean age of our patients was 23.95 years +/- 6.02 years with extremes of 13 and 45 years. The [20-25] year's age group represented 31.8% of cases. Fifty-eight-point three percent (58.3%) of cases were aged [15-25] years. The majority of patients were single (73.5%), unemployed (40.4%) and students (37.1%).

Table 2 Socio demographic characteristics

Variables	Number N=151	Frequency (%)
Age (years)		
[10-15]	1	0.7
[15-20]	40	26.5
[20-25]	48	31.8
[25-30]	36	23.8
[30-35]	16	10.6
[35-40]	8	5.3
[40-45]	2	1.3
Profession		
Housewife	61	40.4
Student	56	37.1
Trader	15	9.9
Civil servant	12	7.9
Rural dweller	1	0.7

Table Continued

Variables	Number N=151	Frequency (%)
Others (private sector)	3	1.9
Marital status		
Married	37	24.5
Single	111	73.5
Widow	1	0.7
Divorced	2	1.3

Seasonal changes

Figures 1 & 2 shows changes in the number of cases of eclampsia according to months and seasons. March had the most cases (18.5%; 28/151), and we registered the majority of cases during the major rainy season (43.7%; 66/151).
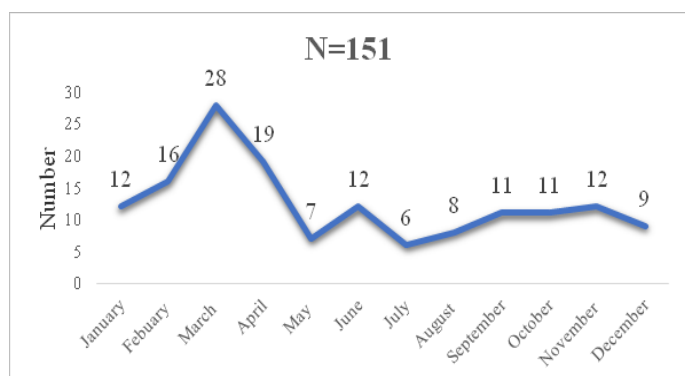

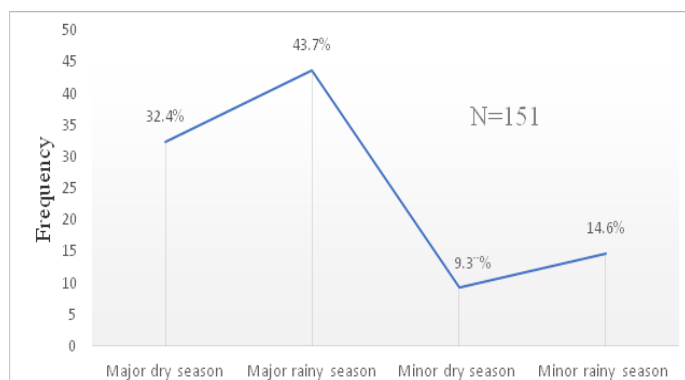**Figure 1** Patients distribution by month of admission.

Figure 2 Patients distribution by season of admission.

Clinical characteristics

Obstetrical history: Table 3 reveals the clinical characteristics of our patients. The majority of them were primigravidae (82/151; 54.3%), nulliparous (83/151; 54.9%) and had gotten pregnant via a new partner (87/151; 57.6%). A small proportion of our patients had a history of hypertensive disease in pregnancy with only 4% (6/151) having a past history of preeclampsia/eclampsia. Eclampsia scarcely occurred in patients with chronic hypertensive disease (4/151; 2.7%).

Antenatal care findings

Table 4 shows patients' antenatal care data. Less than half of our patients (43.0%; 65/151) had at least 4 antenatal consultations,

some women never attended antenatal care (8/151; 5.3%), and only 12.6% (19/151) did an assessment for proteinuria during antenatal consultations.

Table 3 clinical characteristics of patients

Variables	Number N=151	Frequency (%)
Number of pregnancies		
1	82	54.3
2–3	43	28.5
4–5	19	12.6
≥6	7	4.6
Number of deliveries		
0	83	54.9
1	27	17.9
2–3	33	21.9
4–5	7	4.6
≥6	1	0.7
Partners		
Habitual partner	60	39.7
New partner	87	57.6
Unknown	4	2.6
Personal obstetrical pathologic history		
Eclampsia	2	1.3
Preeclampsia	4	2.7
Gestationnal hypertension	5	3.3
Contributing personal medical pathologic history		
chronic hypertension	4	2,7
Diabetes	1	0,7
Nephropathy	1	0,7
Alcohol consumption	4	2.7

Table 4 Antenatal consultation findings

Variables	Number N=151	Frequency (%)
Number of ANC		
0	8	5.3
1–3	78	51.7
≥4	65	43
Proteinuria during ANC		
done	19	12.6
Not done	30	19.9
Not inquired	102	67.6

ANC, antenatal consultation

Clinical findings

Table 5 reveals the clinical findings in our patients. These were more often referred cases from other hospitals (106/151; 70.2%)

with eclampsia being the reason for referral in 83% of cases. The recurrent symptoms on admission included seizures (98%; 148/151) and headaches (93.4%; 141/151) (Figure 3).

Table 5 admission conditions

Variables	Number N=151	Frequency (%)
Mode of admission		
Referrals	106	70.2
Direct	45	29.8
Reason of referral		
Pré eclampsia	18	17
Eclampsia	88	83

Figure 3 Patients clinical manifestations.

*Constrictive epigastric pains

Clinical presentation

Table 6 describes the clinical findings in our patients. Most of them had seizures prior to delivery (70.9%; 107/151). Most cases occurred after 33 weeks of pregnancy (74.4%; 87/151). Consciousness was altered in the majority of cases (80.1%; 121/151): The patients presented with severely raised systolic and diastolic blood pressure values at 74.8% (113/151) and 92.1% (139/151), respectively.

Table 6 clinical findings

Variables	Number N=151	Frequency (%)
Seizure timing		
Ante partum	107	70.9
Per partum	10	6.6
Post-partum	34	22.5
Consciousness		
Conscious	30	19.9
Obnibulated	53	35.1
Stage I coma	56	37.1
Stage II coma	9	5.9
Stage III coma	3	1.9
Systolic Hypertension		
	38	25.2

Table Continued

Variables	Number N=151	Frequency (%)
Severe	113	74.8
Diastolic hypertension		
	12	7.9
Severe	139	92.1
Gestational age at seizure (weeks)		
<28	8	6.8
28-32	22	18.8
33-37	39	33.3
37-40	36	30.8
≥40	12	10.3

Management aspects

Figure 4 shows the treatment regimen administered to patients. Rehydration with Normal saline at 0.9% (97.4%; 147/151) and nasal oxygen (71.5%; 108/151) were the resuscitation measures of choice. Magnesium sulphate was frequently used to manage seizures (89%; 148/151) and Nicardipine was needed (used) in 76.8% (116/151) of our patients. 77.8% (91/151) of our patients delivered by caesarean section.

Table 7 describes the observed maternal complications. HELLP syndrome was the most frequent complication (9.9%; 15/151). Maternal mortality had a frequency of 8.6% (13/151). Figure 5 describes the observed foetal complications. More than half of newborns had a low birth weight (59.7%; 71/119).

Table 7 Maternal Complications

Complications	Number N=151	Frequency (%)
Status eclampticus	9	5.9
HELLP syndrome	15	9.9
Acute kidney injury	8	5.3
Disseminated intravascular coagulation	3	1.9
Placental abruption	3	1.9
Acute pulmonary oedema	1	0.7
Stroke	7	4.6
Maternal death	13	8.6

Discussion

The frequency of eclampsia varies with the level of development across different countries. This frequency is linked to the quality of antenatal care. Well-organised health systems are able to significantly reduce this complication of preeclampsia, given that precursor signs tend to occur much earlier in pregnancy. We wanted to emphasize the importance of eclampsia in our daily practice, especially as it is a significant cause of maternal death in our hospital.[16] This study revealed a frequency at 9.6 cases per 1000 births, like previous findings in literature.[12,19] Buambo et al.[20] in the Congo in 2009 reported a lower frequency at 5.8 per 1000 births[20] but Ouattara et

al.[6] in 2015 in Burkina-Faso found a higher frequency, 33 per 1000 births.[6] The ability to detect raised blood pressures early in the course of pregnancy enables early detection of preeclamptic women, ensuring better management and hence preventing the occurrence of complications like eclampsia. This is the reason why the incidence of eclampsia is lower in developed countries, or those countries with efficient health care systems. Prevalence of eclampsia for instance was reported at 0.003% in Sweden[21] 0.02 % in United Kingdom[22] many years ago and 0.08% in USA in 2013.[12] Eclampsia is the most frequent complication of preeclampsia.[23]

Risk factors for preeclampsia complications are extensively described in literature.[24,25] Age is one of the most frequently cited risk factors, specifically young age.[4]

The mean age of our population was 23.95 years as found by other authors.[17,20,26] Women aged between 15-25 years are often involved,[7] but in Nigeria Esike et al.[27] in 2017 reported an older average age of 27.5 years, with the 20-30 years age range being the most affected,[27] raising the possibility of other confounding factors.
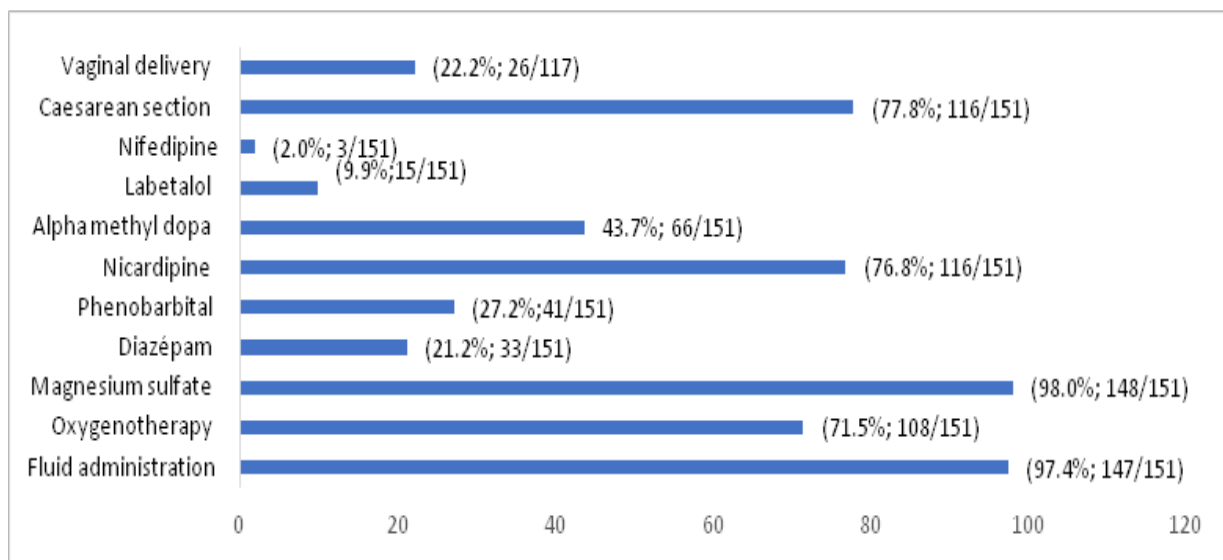

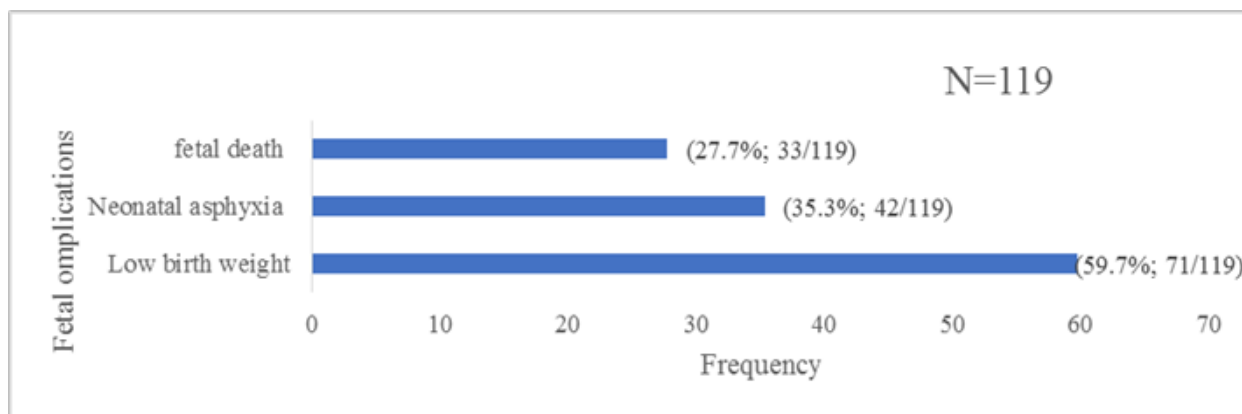**Figure 4** Patients distribution according to management.

Figure 5 Patients distribution according to foetal complications.

The first pregnancy generally occurs at a young age. This explains why 54.3% of our patients were primigravidae. This result is consistent with some previously published.[20,27,28] It is postulated that preeclampsia caused a maternal immune response after an initial exposure to trophoblastic villi which contain antigens of paternal origin.[29]

The majority of our patients were housewives, students and unmarried females. The follow up of pregnancy is usually problematic for these vulnerable classes of people. When pregnancy occurs

alongside prevailing poverty, the ensuing stress can predispose the women to raised blood pressure levels.[30] In addition, poverty impedes on quality antenatal care.

Poor antenatal follow-up is a risk factor for the occurrence of eclampsia.[31] In our study 5.3% of patients never received antenatal care, a lower value when compared to other sub-Saharan publications.[17,14,20] More than half of eclamptic cases (51.7%) had below standards antenatal consultations according to national recommendations. Antenatal care is indeed essential for early detection of pathologies

including hypertensive diseases in pregnancy. Only good quality antenatal care would permit early detection of preeclampsia and prevent its evolution to eclampsia.

Concerning the marital status, the majority were unmarried (73.5%) and 57.6% had a new partner. Exposure to new sperm is another reported risk factor for preeclampsia.[32] The hypothesis of a relationship between this high proportion of singles and new partner due to the fact that singles frequently change their partners was not investigated in this and needs to be confirmed.

The frequency of eclampsia varied with the seasons of the year with a peak during the major rainy season (43.7%, 66/151). In 2013 Diouf et al.[17] in Senegal and Ugochukwu et al.[33] in Nigeria reported peak frequencies during the rainy season at 38.7% and 67.4% respectively.[17,33] This could be due to low temperatures and humidity, which provoke vasoconstriction, and/or the production of vaso-active substances as reported during winter by Neela et al.[34] in Norway and Wang et al.[35] in China.

The poor state of the roads during the rainy season may also play a role by hindering the ability to reach health care facilities, access to early and good quality ANC and even delaying reference to better health facilities after onset of pre-eclampsia allowing the full expression of pre-eclampsia and its complications including eclampsia. Our findings revealed that more often our patients were referred patients from other healthcare facilities (70.2%; 106/151) and eclampsia occurred mostly in women before term as reported by several studies.[6,14,17,20,27] Our study took place in a university teaching hospital with the capacity to manage complicated pregnancies, such as, preterm deliveries. The management of prematurity requires an adequate environment, which is likely an additional reason for referral of these women since eclampsia often occurs before the onset of labour as reported by other authors and ourselves.[36]

Headache was the most frequent premonitory sign of eclampsia (93.4%), as known today.[37,38] These headaches were isolated or associated with other symptoms like vertigo (33.1%), constrictive epigastralgia (18.5%). Convulsions in women in labour are diversely described in literature. The frequency was lower in France as described by Ducarme[36] but markedly elevated in Africa with rates between 27 and 36%,[14,17,39] giving the impression of an african peculiarity. The mean age of onset of post-partum eclampsia was 2.2 days, with a frequency of 22.5% in our study. Of interest is the fact that the incidence of post-partum eclampsia is non-negligible, even though delivery is reported as the definitive treatment. As such, it is necessary to continuously monitor women after delivery until they are stable and have attained base-line state.

The American College of Obstetricians and Gynecologists (ACOG) recommends treatment for BP values ≥160/105mmHg.[18] Severe hypertension prevailed at 74.8% and 92.1% for systolic and diastolic values respectively. This was compatible with findings by other authors.[18] The most used anti-hypertensive medication in our context was Nicardipine mostly because of the lack of Hydralazine which is the drug of choice recommended by the WHO.[37] Magnesium sulphate was the main anti-convulsant used on 98% of cases. It is also recommended by the Cameroon public Health Ministry and its efficacy has been proven.[11]

The majority of eclamptic patients delivered by caesarean section in our setting as it permits expeditious delivery when cervical immaturity impedes rapid vaginal delivery. Vaginal deliveries were

mostly in women who presented with eclampsia in an advanced stage labour. This is because the morbidity and mortality linked to eclampsia prompts us to opt for caesarean deliveries in resource-apt patients especially owing to inadequate surveillance facilities if a vaginal delivery were indicated. In literature the rate of caesarean deliveries linked to eclampsia were similar to ours with values between 61 and 75%.[17,20]

The complications observed in our patients with our management realities were all known and expected complications. Essiben et al.[38] found that post-operative complications were more frequent in patients with preeclampsia. Status eclampticus was rare (5.9%). Maternal mortality was 8.6% comparable to findings by Ouattara et al.[16] in 2015 in Burkina Faso[6] who described a 6.4% maternal mortality rate. On the other hand, infant mortality was quite high at 24.4 % in our series.

Eclampsia in our service is managed as per norms and standards. However management delays constitute a significant problem. This explains why complications are prevalent and also why it is highly associated to maternal and perinatal mortality. Our results could be improved if we train peripheral health structures in the early detection of cases of preeclampsia, while ensuring the availability of medications for the management of any ensuing eclampsia. This also applies to tertiary healthcare facilities which must manage their resources, taking into consideration the seasonal variability in the incidence of this condition.

Study limitations

Some limitations have to be considered. Significant parts of patients' medical records were missing and pertinent information absent leading their exclusion for this study. We were unable to assess premonitory signs of the disease as patients' recall was poor.

Conclusion

The frequency of eclampsia remains low but occurs preferentially in the rainy season. Young women are the most affected as are singles and nulliparous patients referred from other healthcare facilities. The maternal and perinatal morbidity and mortality remain high and justify the need to improve access to quality antenatal care to prevent the disease as well as a forecast of human and material resources taking into account the seasonal distribution of the disease.

Authors' contributions

Essiben Felix, Foumane Pascal and Wandji Yemga Dorielle Vanessa conceived the study, participated in the study design and collection data. Essiben Félix, Wandji Yemga Dorielle Vanessa and Meka Um Esther have been involved in analysis, interpretation of data and drafting of the manuscript, Ojong Samuel and Mve Koh Valere in review of the article. Foumane supervised the study. All authors have read and approved the final manuscript.

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Conflicts of interest

The authors declare no conflict of interests.

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