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Research Article

Predictors of eclampsia among preeclamptic patients: a case control study in Yaounde, Cameroon

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ABSTRACT

Background: Preeclampsia is a major cause of maternal mortality. Eclampsia is a dramatic complication of preeclampsia. This study aimed at identifying clinical predictors of eclampsia among preeclamptic patients.
Methods: We carried out a case-control study from November 1, 2014 to April 30, 2015 in six health facilities in Yaounde. Cases were women who have had eclamptic seizures antepartum, perpartum or within 48 hours of delivery. Controls were preeclamptic women who did not convulse till 48 hours after delivery. Unadjusted and adjusted Odds Ratios were calculated.
Results: After univariable analysis the following parameters were associated with eclampsia: headache (uOR: 2.9; 95% CI: 1.4-6.2) and absence of stable income (uOR: 17.6; 95% CI: 6.2-49.8). After multivariate analysis predictors of eclampsia among pre-eclamptic patients were: age <20 years (aOR: 2.5; 95% CI: 1.0-5.9), family history of high blood pressure in the mother (aOR: 4.8; 95% CI: 1.2-19.3), antenatal care by a nurse auxiliary (aOR: 9.3; 95% CI: 2.4-35.9), right upper abdominal quadrant pain (aOR: 9.9; 95% CI:1.2-77.9) visual disturbances (aOR:7.9; 95% CI: 2.3-26.9).
Conclusions: These predictors of eclampsia can be used for early initiation of aggressive preventive therapy in pre-eclamptic patients.

Keywords: Pre-eclampsia, Eclampsia, Predictors, Hypertension, Pregnancy, Cameroon

INTRODUCTION

Ninety nine percent of the 800 daily maternal deaths occurring worldwide are recorded in developing countries.[1] Hypertensive disorders in pregnancy are the third cause of maternal mortality.[1,2] Pre-eclampsia complicates 0.5-2% of pregnancies in rich countries. In Cameroon, the prevalence of hypertensive disorders in pregnancy is 8.2% while that of pre-eclampsia is between 5.9 and 6.4%.[3-5] In 2009, eclampsia occurred in 9.5 out of

1000 deliveries at the Yaounde General Hospital.[6] Hypertensive disorders were the third cause of maternal mortality at the Yaounde central Hospital and the second cause at the Yaounde General Hospital.[8] These hospitals are the most important health facilities in the country's capital. A study carried out in the referral Hospital of the most populated region of Cameroon revealed that eclampsia was the cause of 17.5% of maternal deaths.[7] Given that national statistics are not available those figures can be extrapolated to the whole country. An unpublished study conducted at the Yaounde gynaeco-obstetric and pediatric hospital in 2010 revealed that eclamptic seizures occur in 2-3% of pre-eclamptic women without appropriate prophylaxis.[8] The aim of this study was to determine clinical predictors of eclampsia among pre-eclamptic women.

METHODS

This case-control study was carried out in six health facilities in Yaounde: two tertiary hospitals (the Yaounde gynaeco-obstetric and pediatric hospital (YGOPH), the Yaounde central hospital (YCH)), three district hospitals. (The Efoulan district hospital (EDH), the Cite-Verte district hospital (CDH) and the Biyem-Assi district hospital (BDH)) and one faith-based hospital (centre d'animation sociale et sanitaire of Nkoldongo (CASS)). The study was conducted from November 1, 2014 to April 30, 2015.

Cases were women who had eclamptic seizures during pregnancy, labour or within 48 hours of delivery. Controls were preeclamptic women who did not have seizures untill the 48th hour post-partum. Schlesselman's formula was used to determine the minimal sample size (at least 25 subjects per group). Sampling was consecutive and non-probabilist. CS Pro® version 5.0 and SPSS® version 20.0 softwares were used respectively for data collection and for statistical analysis.

Exposures variables were socio-demographical (age, marital status, occupation, level of instruction, stability of income) and clinical (gestity, parity, pre-gestational body mass Index, headache, tinnitus aurium, nausea/vomiting, epigastric pain, right upper quadrant pain, visual disturbances, pedal œdema, vertigo/drowsiness, dyspnoea, tendon reflexes, systolic blood pressure, diastolic blood pressure and diuresis).

The probability on type 1 error was 0.05. Unadjusted and adjusted Odds Ratios (OR) with 95% confidence intervals (CI) were used to measure association between exposure variables and eclampsia. Only variables found to be associated with eclampsia after univariate analysis were included in the model of multiple logistic regressions. Chi2 test and Fisher's exact test were used to compare qualitative variables. A clearance was obtained from the institutional ethical committee of the Yaoundé gynaeco-obstetric and pediatric hospital (N° CE E933/ CE/ MINSANTE /HGOPY/ PCA/DG/DGA/SCAJ/nm. Administrative clearances were obtained from the management of each hospital where we recruited participants. Data were collected after informed consent and were managed confidentially and anonymously. Participants were recruited within 48 hours of delivery. All patients presenting severe pre-eclampsia were treated by magnesium sulphate and nicardipine.

RESULTS

Out of the 228 women admitted for preeclampsia during the study period, 226 were included (two patients refused to participate). Sixty three of the 226 (27.9%) participants had eclampsia.

Associations between participants' characteristics and eclampsia

Table 1 shows associations of participants' characteristics with eclampsia (univariate analysis). Age younger than 20 years old was strongly associated with eclampsia (uOR: 3.4; 95% CI: 1.6-7.2). University education was protective against eclampsia (uOR: 0.3; 95% CI: 0.1-0.7). Absence of a stable income was strongly associated with eclampsia (uOR: 17.6; 95% CI: 6.2-49.8). Primiparity was associated with eclampsia (uOR: 2.7; 95% CI: 1.4-5.3). Antenatal care by a nursing auxillary was associated with eclampsia (uOR: 5.0; 95% CI: 2.2-11.7) while care by an obstetrician-gynaecologist was protective (uOR:0.3; 95% CI: 0.1-0.8).

Associations between symptoms and eclampsia

Table 2 shows distribution of symptoms and their associations with eclampsia (univariate analysis). The following symptoms were associated with the occurrence of eclampsia: headache (uOR: 2.9; 95% CI: 1.4-6.2), visual disturbances (uOR: 4.4; 95% CI: 2.3-8.8), epigastric pain (uOR: 2.5; 95% CI: 1.4-4.7) and right upper abdominal quadrant pain (uOR: 8.6; 95% CI: 2.7-27.7).

Associations between physical signs and eclampsia

Table 3 shows associations between physical signs and eclampsia (univariate analysis). The following signs were associated with eclampsia: exaggerated tendon reflexes (uOR: 4.3; 95% CI: 1.9-9.8), diastolic blood pressure above 110 millimetres of mercury mmHg (uOR: 2.2; 95%CI: 1.2-3.9), pre-gestational body mass index (BMI) less than 25 kilograms/square metre (kg/m^2): (uOR: 2.5;95% CI: 1.4-4.6). Oedema of the lower limbs was not associated with eclampsia (uOR: 1.1;95% CI: 0.5-2.3).

Table 1: Associations of participant's characteristics with eclampsia.

Characteristics	Eclampsia N = 63	No eclampsia N = 63	uOR (95% CI)
Age (years)	**N (%)**	**N (%)**	
<20	18 (28.6)	17 (10.4)	3.4 (1.6-7.2)
20-25	22 (34.9)	40 (24.5)	2.1 (1.1-4.0)
26-30	10 (15.9)	58 (35.6)	0.4 (0.2-0.9)
≥31	13 (20.6)	48 (29.5)	0.5 (0.3-1.02)
Level of education			
None	2 (3.2)	5 (3.1)	1.0 (0.2-5.5)
Primary	12 (19.0)	16 (9.8)	2.2 (0.9-4.9)
Secondary	41 (65.1)	87 (53.4)	1.6 (0.9-2.8)
Tertiary	8 (12.7)	55 (33.7)	0.3 (0.1-0.7)
Stability of income			
Yes	4 (6.3)	43 (26.4)	0.2 (0.1-0.6)
No	59 (93.7)	120 (73.6)	17.6 (6.2-49.8)
Parity			
1	32 (50.8)	61 (37.4)	2.7 (1.4-5.3)
2-3	26 (41.3)	75 (46)	2.3 (1.1-5.1)
4-5	4 (6.3)	19 (11.7)	1.1 (0.3-3.8)
≥6	1 (1.6)	8 (4.9)	0.6 (0.7-5.2)
Family history of HTN in mother			
Oui	36 (57,1)	48 (29,4)	3.2 (1.8-5.8)
Non	27 (42,9)	115 (70,6))	0.3 (0.2-0.6)
Qualification of health staff at ANC	N = 59 (100)	N = 160 (100)	
Nursing auxillary	16 (27.1)	11 (6.9)	5.0 (2.2-11.7)
Nurse/midwife	36 (61.0)	90 (56.3)	1.2 (0.7-2.2)
GP	0 (0.0)	12 (7.5)	NA
Obstetrics/gynaecology	7 (11.9)	47 (29.4)	0.3 (0.1-0.8)

uOR: unadjusted odds ratio; CI: confidence interval; ANC: antenatal consultation; Obst/Gyn: obstetrician/gynecologist; GP: general practitioner. HTN: hypertension. NA: not applicable

Table 2: Associations between symptoms and eclampsia.

Symptoms	Eclampsia N = 63	No eclampsia N = 163	uOR (95% CI)
Tinnitus aurium			
Yes	8 (12.7)	16 (9.8)	1.1 (0.4-2.7)
No	55 (87.3)	147 (90.2)	0.8 (0,3-1,9)
Headache			
Yes	51 (82.3)	81 (61.2)	2.9 (1.4-6.2)
No	12 (17.7)	52 (38.8)	0.4 (0.2-0.8)
Visual disturbances			
Yes	41 (66.1)	41 (30.6)	4.4 (2.3-8.8)
No	22 (33.9)	122 (69.4)	0.2 (0.1-0.3)
Epigastric pain			
Yes	31 (50)	38 (28.4)	2.5 (1.4-4.7)
No	32 (50)	125 (71.6)	0.3 (0.2-0.6)
Right upper quadrant pain			
Oui	13 (21)	4 (3)	8.6 (2.7-27.7)
Non	50 (79)	159 (97)	0.1 (0.03-0.3)

uOR: unadjusted odds ratio; CI: confidence interval.

Table 3: Associations between physical signs and eclampsia.

Physical signs	Eclampsia N = 63	No eclampsia N = 163	uOR (95% CI)
Exaggerated tendon reflexes			
Yes	38 (60.3)	49 (28.2)	4.3 (1.9 - 9.8)
No	10(15.9)	56 (34.4)	0.4 (0.2-0.8)
Not tested	15 (23.8)	58 (37.4)	0.6 (0.3 -1.1)
Systolic blood pressure			
<160	25 (39.7)	84 (51.5)	0.6 (1.3-1.1)
≥160	38 (60.3)	79 (48.5)	1.6 (0.9-2.9)
Diastolic blood pressure			
<110	36 (57.1)	121 (74.3)	0.5 (0.3-0.8)
≥110	27 (42.9)	42 (25.7)	2.2 (1.2-3.9)
Œdema of the lower limbs			
Yes	51 (81)	130 (79.8)	1.1 (0.5 -2.3)
No	12 (19)	33 (20.2)	0.9 (0.5-1.9)
Pre-gestational BMI (kg/m^2)			
<25	38 (60.4)	61 (37.4)	2.5 (1.4-4.6)
25-30	21 (33.3)	67 (41.1)	0.7 (0.4-1.6)
≥30	4 (3.3)	37 (21.5)	0.3 (0.1-0.7)

BMI: body mass index; Kg: klogramme; m^2: square metre

Predictors of eclampsia among pre-eclamptic patients

Table 4 shows predictors of eclampsia after multiple logistic regression. After adjustments only the following independent variables were still associated with eclampsia: right abdominal upper quadrant (aOR: 9.9; 95% CI: 1.2-77.9), antenatal care by a nursing auxillary (aOR: 9.3; 95% CI: 2.4-35.9), visual disturbances (aOR: 7.9; 95% CI: 2.3-26.9), family history of high blood pressure in mother (aOR:4.8; 95% CI: 1.2-19.3), age younger than 20 years (aOR: 2.5; 95% CI: 1.0-5.9).

Table 4: Predictors of eclampsia after multivariable analysis.

Predictors	aOR	95% CI
Right upper quadrant pain	9.9	1.2-77.9
ANC by nursing auxiliary	9.3	2.4-35.9
Visual disturbances	7.9	2.3-26.9
Family history of HTN in mother	4.8	1.2-19.3
Age < 20 years	2.5	1.0-5.9

ANC : antenatal consultation. HTN: hypertension. aOR: adjusted odds ratio

DISCUSSION

In our series the prevalence of eclampsia among pre-eclamptic was 27.9% (63/226). This result is similar to that reported by Moj et al. in Madagascar in 2011 (31.8%), but lesser than that obtained by Tebeu et al. in far north Cameroon in 2012 (36.8%).[9,10] We found that age under 20 years was an independent risk factor of eclampsia among pre-eclamptic patients with an odds ratio of 2.5 (95% CI: 1.0-5.9). In far north Cameroon (2012), Tebeu et al. found that maternal age under 20 years was strongly associated with eclampsia (OR: 8.5; 95% CI: 4.0-18.6) among women presenting hypertensive disorders in pregnancy.[10]

In the United States of America (USA), Coghill et al. had similar findings in 2011.[11] Mayi-Tsonga et al. also found age under 19 to be associated with eclampsia in Gabon in 2006 (OR: 3.4; 95% CI: 1.8-6.5).[12] On the contrary, in a review of controlled studies, Duckitt et al. concluded that young maternal age did not seem to affect the risk of developing pre-eclampsia, whichever cut off age was used.[13] This may be due to the fact that the studies they reviewed were carried out in populations different from ours. Clinicians in our context should therefore be more vigilant vis-à-vis seizures in teenagers with pre-eclampsia.

In our study, antenatal care (ANC) by a nursing auxillary was associated with eclampsia (aOR: 9.3; 95% CI: 2.4-35.9). This is a very important fact in Cameroon where 62.3% of antenatal consultations are carried out by nurses, midwifes and nursing auxiliaries.[14] Further training in better management (immediate referral to obstetrician-gynecologist) of women diagnosed with pre-eclampsia should be organized for those nursing auxiliaries providing antenatal care. Indeed, antenatal care by obstetrician-gynecologist was protective against eclampsia among pre-eclamptic women (uOR: 0.3; 95% CI: 0.1-0.8).

Family history of hypertension in the mother was associated with eclampsia (aOR: 4.8; 95% CI: 1.2 -19.3) in our study. In a study far north Cameroon Tebeu et al. found that family history of hypertension in a first degree

relative was not associated with eclampsia among women with pregnancy-related hypertension.[10]

In our series, primiparity (uOR: 2.7 95% CI: 1.4-5.3), primigravidity (uOR: 3.1; 95% CI: 1.7-5.6), and pauciparity (uOR: 2.34; 95% CI: (1.1-6.1) increased the risk of eclampsia. Duckitt et al. reported that nulliparity tripled the risk of pre-eclampsia (uOR: 2.91. 95% CI: 1.3-6.6) and Tebeu et al. found that nulliparity multiplied by nine the risk of eclampsia among women with pregnancy related hypertension (uOR: 9.2; 95% CI: 3.1-27.7).[10,13] Kullberg et al. reported similar findings with a two-fold increased risk of eclampsia among nulliparous.[15] These findings support the immunologic theory of preeclampsia stating the primo movens of pre-eclampsia is rejection of sperm cells by the mother's immune system after a short period of sexual cohabitation.[16]

Right upper abdominal quadrant pain (aOR: 9.9; 95% CI: 1.2-77.9), headache (uOR: 2.9; 95%CI: 1.4-6.2) and (aOR: 7.9; 95% CI: 2.3-26.9) visual disturbances were associated with eclampsia in our series. Salem B et al. reported similar findings.[17] Indeed those signs are classically referred to as signs of imminent eclampsia.[18]

CONCLUSION

Eclampsia is a common complication of pre-eclampsia. This study has identified some predictors that can be used to initiate aggressive preventive therapy among pre-eclamptic patients at higher risk of developing eclampsia.

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REFERENCES

1. Sprunck A, Collange O, Pottecher T. Prééclampsie, éclampsie, HELLP syndrome : définitions, éléments de diagnostic et de prise en charge. 51 e Congrès national d'anesthésie et de réanimation. Médecins. Urgences vitals. 2009:1-9.
2. OMS Mortalité maternelle. WHO 2014. Available at http://www.who.int/mediacentre/factsheets/fs348/fr/. Accessed 26 March 2015.
3. Mboudou E, Foumane P, Belley Priso E, Dohbit J, Ze Minkande J, Nkengafac WM. l'Hypertension au cours de La Grossesse: Aspects cliniques et épidémiologiques à l'Hôpital Gynéco-Obstétrique et Pédiatrique de Yaoundé, Cameroun. Clin Mother Child Health. 2009;6(2):1087-93.
4. Leke RJI. Outcome of delivery at the central maternity. Ann Univ Sc Santé. 1987;4(1):332-0.
5. Kyebyene MA. Evaluation de la prise en charge des complications de la pré-éclampsie à l'Hôpital Central de Yaoundé mémoire de diplôme de spécialiste en sciences cliniques. Yaoundé Cameroun. Faculté de Médecine et des Sciences Biomédicales. Université de Yaoundé I; 2013.
6. Belley Priso E, Njamen TN, Coulibaly A, Mboudou E, Doh A. L'éclampsie A L'Hôpital General De Douala : Aspects Épidémiologiques Et Pronostiques. Health Sci Dis. 2013;10(4).
7. Tebeu PM, Ngassa P, Kouam L, Major AL, Fomulu JN. Maternal mortality in maroua provincial hospital, Cameroon (2003-2005). West Indian Med J. 2007;56(6):502-7.
8. Abdoulaye N. Mortalité maternelle à l'Hôpital Général de Yaoundé: Etude rétrospective 1996-2005. Yaoundé: Faculté de Médecine et des Sciences Biomédicales. Université de Yaoundé I; 2006.
9. Moj HN, Randriambololona DMA, Rasolonjatovo T, Ranoaritiana DB, Fidison A, Rakotoambinina B. De la pré-éclampsie à l'éclampsie: quels sont les facteurs de risque? Rev Trop Chir. 2010;4:30-2.
10. Tebeu PM, Halle G, Lemogoum D, Simo WAG, Kengne FG, Fomulu JN. Risk factors for eclampsia among patients with pregnancy-related hypertension at Maroua Regional Hospital, Cameroon. Int J Gynaecol Obstet. 2012;118(3):254-6.
11. Coghill AE, Hansen S, Littman AJ. Risk factors for eclampsia: a population-based study in Washington State, 1987-2007. Am J Obstet Gynecol. 2011;205(6):553e1-553e7.
12. Mayi-Tsonga S, Akouo L, Ngou-Mve-Ngou JP, Meye JF. Facteurs de risque de l'éclampsie à Libreville (Gabon): étude cas-témoins. Cah D'études Rech Francoph. 2006;16(3):197-200.
13. Duckitt K, Harrington D. Risk factors for pre-eclampsia at antenatal booking: systematic review of controlled studies. BMJ. 2005;330(7491):565.
14. National institute of statistics-Cameroon. Demographic, health and multiple indicators cluster survey 2011. Yaounde: institut national de statistique; 2012. Available at http://www.statistics-cameroon.org/manager.php?id=6.
15. Kullberg G, Lindeberg S, Hanson U. Eclampsia in Sweden. Hypertens Pregnancy. 2002;21(1):13-21.
16. Robillard P, Hulsey T, Pénanin J, Janky E, Miri E, Papiernik E. Association of pregnancy-induced hypertension with duration of sexual cohabitation before conception. Lancet. 1994;344:973-5.
17. Ben Salem F, Ben Salem K, Grati L, Arfaoui C, Faleh R, Jamel A, et al. Facteurs de risque

d'éclampsie: étude cas-témoins. Ann Fr Anesth Réanimation. 2003;22(10):865-9.
18. Hypertensive Disorders in Pregnancy. In: Cunningham FG, Levenno KJ, Bloom SL, Hauth JC, Gilstrap III LC, Wenstrom KD, eds. Williams Obstetrics. 22nd edition. New York. McGraw-Hill Companies; 2005:34.

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