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Predictors of eclampsia in patients with preeclampsia

Abstract

Objectives: To evaluate prevalence and predictors of eclampsia in patients with preeclampsia.

Material and Methods: database of 11,026 consecutive births attended between Nov-98 and Jun-04, 323 patients admitted with a diagnosis of preeclampsia (blood pressure >=140-90 in 2 doses plus proteinuria) were included in this retrospective analysis. Eclampsia was diagnosed in the presence of associated seizures. Multiple logistic regression analysis was performed to identify independent markers of eclampsia.

Results: The diagnosis of eclampsia was established in 32 (10%) patients. Patients with and without eclampsia differed in the following characteristics: primiparous (14.7 vs 6.4%, p=0.014), chronic anemia (14.6 vs 7.2%, p=0.031), adolescence (≤ 16 years) (40 vs 8.4%, p =0.002), smoking (29.2 vs 8.4%, p=0.005), multiple pregnancy (47.1 vs 8%, p<0.0001) and obesity (2.1 vs 11.8%, p=0.026). In the multivariate analysis, the independent predictors were the followings: multiple pregnancy (OR=13.6, 95%CI=4.4-41.8, p<0.0001), smoking (OR=4.9, 95%CI=1.6-15.1, p=0.006) and adolescence (OR =17.9, 95%CI=4.7-67.7, p<0.0001). In patients with none, one or two, and three variables, eclampsia occurred in 0% (0 of 265 cases), 44.7% (24 of 47), and 100% (11 of 11), respectively (p<0.0001).

Conclusions: One in 10 patients with preeclampsia developed eclampsia during hospitalization. Three simple and widely available variables (adolescent mothers, smokers, and twin pregnancy) were useful to identify low- and high-risk population.

Keywords: eclampsia, preeclampsia, predictors

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Introduction

High blood pressure frequently complicates the course of pregnancy, affecting around 10% of women who become pregnant and is one of the main causes of maternal and fetal mortality.[1] Preeclampsia is a specific disease of pregnancy that must be interpreted as a clinical and laboratory syndrome with a wide spectrum of manifestations. Clinically it is defined by arterial hypertension and in the laboratory, by the appearance of proteinuria, generally after the 20th week of gestation.[2-5]

The appearance of tonic-clonic seizures that cannot be explained by another cause, in a patient with pre-eclampsia, is called eclampsia. Seizures appear before delivery, or within 48 hours, in most cases. Eclampsia causes approximately 50,000 maternal deaths worldwide each year. In the United States, the maternal mortality rate from eclampsia has been reduced to less than 1% with early diagnosis and aggressive management. Convulsive episodes are occasionally preceded by headache, irritability, hyperreflexia, visual disturbances, and epigastric pain. The condition begins with facial contraction followed by generalized contractions, then tonic-clonic seizures and, finally, coma.[6] The seizures may recur and, during them, aspiration of gastric contents may occur with pneumonia, pulmonary edema, apnea, respiratory disorders. Neurological and death. In developed countries, eclampsia is rare but serious, affecting around 1 in 2,000 births, while in developing countries this figure varies from one in 100 to one in 1,700. It is estimated that 600,000 women worldwide die each year. from causes related to pre-eclampsia, and 99% of these deaths occur in developing countries.[7,8] Clinical and experimental evidence suggests that prolonged seizures can cause significant brain lesions and subsequent brain dysfunction. When refractory, they can cause edema and brain herniation, and predispose to epilepsy and cognitive impairment in the future. Acutely, seizures have significant effects on the cerebrovascular vasculature, damaging the blood-brain barrier and increasing blood flow cerebral blood.[9-12] Almost all patients with eclampsia have changes like so-called posterior reversible encephalopathy syndrome (PRES) on MRI. In both pregnant and non-pregnant patients, it is usually an acute brain disease, which can present with headache, nausea, altered mental function, visual disturbances such as cortical blindness, and seizures. Particularly in pregnant women with preeclampsia-eclampsia, headaches are more frequent than altered mental status as the initial symptom related to PRES, compared to non-pregnant patients.[13]

The eclamptic seizure constitutes a vital emergency.[8] Most cases of preeclampsia occur in healthy primigravids, and therefore it is important to establish the factors that can influence the development of this pathology. Various risk factors are known associated with the presentation of preeclampsia and eclampsia, among which it is worth mentioning extreme maternal age, socioeconomic status, change of paternity, higher body mass index and weight gain during pregnancy.[14-18]

There is no typical patient who can be identified as at risk for eclampsia. However, from an epidemiological point of view, it is important to identify certain characteristics in women with preeclampsia who have different risk categories for developing eclampsia. Therefore, the purpose of this study focuses on determining the risk factors that predict the appearance of eclampsia.

Objectives

To evaluate prevalence and independent predictors of eclampsia in patients with preeclampsia.

Material and methods

Population and definitions

A retrospective analysis was performed on a database of 11,026 consecutive births attended during the period Nov-98/Jun-04 in the maternity ward of our hospital. Among them, 323 patients admitted with a diagnosis of preeclampsia were identified, defined as: two blood pressure values with an interval of 6 hours greater than or equal to 140/90 mmHg, in the presence of abnormal proteinuria.[19] Proteinuria of 24 hours was considered as abnormal or significant at concentrations equal to or greater than 300 mg/24 hours. Eclampsia was defined by the occurrence of sudden seizures in a pregnant woman that cannot be attributed to other causes.[20]

Qualitative variables are expressed as percentages and were compared using Pearson's chi-square or Fisher's exact test. Quantitative variables are presented as mean ± standard deviation and were compared with the t (Student) or Mann Whitney U test. All differences < 0.05 were considered significant. With the variables associated with eclampsia in the univariate analysis, multiple logistic regression analysis was performed to identify independent markers of eclampsia.

Data were analyzed using SPSS 20.

Results

The diagnosis of eclampsia was established in 32 (10%) patients. Patients with and without eclampsia differed in the following characteristics: primiparous (p=0.014), chronic anemia (p=0.031), adolescence (≤ 16 years) (p=0.002), smoking (p=0.005), multiple pregnancy (p <0.0001), and obesity (p=0.026). (Table 1)

Table 1 Variables associated with eclampsia in univariate analysis

Variables	Whith Eclampsia	Without Eclampsia	P
Primíparous	14.7	6.4	0.014
Chronic Anemia	14.6	7.2	0.031
Adolescence	40	8.4	0.002
Smoking	29.2	8.4	0.05
Multiple Pregnancy	47.1	8	0.0001
Obesity	2.1	11.8	0.026

In the multivariate analysis, the independent predictors of eclampsia were multiple pregnancy (OR=13.6, p<0.0001), smoking (OR=4.9, p=0.006) and adolescence (OR=17.9, p<0.0001). (Table 2) The presence of none; one or two; or three variables was associated with an incidence of eclampsia of 0% (0 out of 265 cases), 44.7% (24 out of 47), and 100% (11 out of 11), (p<0.0001).

Table 2 Multiple logistic regression analysis

Variables	Univariate	Multivariate			
	P	p	OR	IC 95%	
Primíparous	0.014				
Chronic Anemia	0.031				
Adolescence	0.002	0.0001	17.9	4.4 -	41.8
Smoking	0.05	0.006	4.9	1.6 -	15.1
Multiple Pregnancy	0.0001	<0.0001	13.6	4.7 -	67.7
Obesity	0.026				

Discussion

The incidence of eclampsia in this population of women with preeclampsia was 10%, higher than that reported in other series of 0.5 to 2%, which could be explained by the low socioeconomic level of these patients as well as the reference characteristics of the center.

The medical literature highlights that younger woman -adolescents- have the higher risk of associated hypertension, which allows us to accept hereditary and immunological theories, that are fundamentally interpreted by the resistance of the uterine muscle and a poor adaptation of the vascular tree to the needs at pregnancy.[21,22] The incidence of eclampsia is reported to be increased in women whose age is younger than 21 years or older than 35 years.[23] Torres et al., in a study carried out in the Hypertension Unit Arterial of the Delivery Room of the "Concepción Palacios" Maternity Hospital, where only patients with severe preeclampsia or eclampsia are admitted, have pointed out, an average age of 28 years, with a range of 13 to 46.[24]

Although chronic anemia was related to eclampsia in the univariate analysis, it did not remain an independent predictive factor. Despite this, it has been shown that nutritional deficiency is linked to eclampsia. The high prevalence observed in the present study, might be associated to poor socioeconomic condition of the patients and because it is an endemic area for parasitosis.

Multiple pregnancy doubles the risk of preeclampsia because there is a large placental mass, which is known to represent the center of the problem of preeclampsia.[25,26] In addition, lower placental perfusion may be another element that explains this association. The risk of preeclampsia-eclampsia rises to 10% to 20% in double pregnancies, up to 25% to 60% in triple pregnancies, and can reach up to 90% in quadruple pregnancies.[27]

In an important prospective and multicenter study, Sibai et al.[28] reported the existence of an inverse relationship between cigarette smoking and the risk of preeclampsia. However, in that study, this risk was lower for those patients who stopped smoking at the beginning of pregnancy. The prevalence of smoking in patients with eclampsia was 29.2%, and this generates controversy with multiple reviews. On this matter, Goerig et al.[29] showed that nicotine, one of the components of cigarette smoke, inhibits the production of TromboxaneA2, possibly through blocking the enzyme thromboxane synthetase. Nicotine can also act directly on the nicotinic receptors of the placenta, releasing placental acetylcholine, which facilitates the release of nitric oxide, the endothelial relaxing factor.[30] Other effects of smoking that could explain the decreased risk of preeclampsia may be mediated by inhibition of cytokine production[31] and an antioxidant effect.[32]

Maternal weight is always recorded by obstetrician during pregnancy visit, because the increase beyond normal limits constitutes a risk factor for the development of preeclampsia-eclampsia. Sibai et al.[33] have reported that weight gain greater than 2 kg per week, particularly during the third trimester, is associated with a greater risk of suffering from this pathology.

The identification of risk factors should serve to carry out more frequent prenatal surveillance and with special clinical guidance towards the early identification of this complication.

Conclusion

One in 10 patients with preeclampsia developed eclampsia during hospitalization. Three simple and widely available variables (adolescent mothers, smokers, and twin pregnancy) were useful to identify low- and high-risk population.

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Conflicts of interest

Authors declare that there is no conflicts of interest.

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