Scientific Research Publishing

Open Journal of Obstetrics and Gynecology, 2024, 14, 565-574
https://www.scirp.org/journal/ojog
ISSN Online: 2160-8806
ISSN Print: 2160-8792

Predictive Factors for Pre-Eclampsia: A Case-Control Study in Two Hospitals in Yaounde

Junie Annick Metogo Ntsama[1], Ines Winnie Gouanfo[1], Claude Hector Mbia[1], Wilfried Loic Tatsipie[1*], Pascal Mpono[1], Madye Ngo Dingom[2], Felix Essiben[1], Claude Cyrille Noa Ndoua[1]

[1]Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Yaoundé, Cameroon
[2]Faculty of Medicine and Pharmaceutical Sciences, University of Dschang, Dschang, Cameroon
Email: *tatsipien@yahoo.fr

How to cite this paper: Ntsama, J.A.M., Gouanfo, I.W., Mbia, C.H., Tatsipie, W.L., Mpono, P., Dingom, M.N., Essiben, F. and Ndoua, C.C.N. (2024) Predictive Factors for Pre-Eclampsia: A Case-Control Study in Two Hospitals in Yaounde. *Open Journal of Obstetrics and Gynecology*, **14**, 565-574.
https://doi.org/10.4236/ojog.2024.144050

Received: March 20, 2024
Accepted: April 21, 2024
Published: April 24, 2024

Abstract

Introduction: Pre-eclampsia is a major cause of maternal and prenatal morbidity and mortality, that complicates 2% to 8% of pregnancies worldwide. The aim of this study was to determine the predictive factors for pre-eclampsia in two hospitals in the city of Yaoundé. **Methods:** A case-control study was conducted at the Gynaecology & Obstetrics department of the Yaoundé Gynaeco-Obstetric and Paediatric Hospital (YGOPH) and the Main Maternity of the Yaoundé Central Hospital (MM-YCH) from February 1 to July 30, 2022. The cases were all pregnant women presenting with pre-eclampsia. The control group included pregnant women without pre-eclampsia. Descriptive statistics followed by logistic regression analyses were conducted with level of significance set at p-value < 0.05. Data were analysed using Epi info version 7.2.5.0 and SPSS version 23.0 software. **Results:** Included in the study were 33 cases and 132 controls, giving a total of 165 participants. The predictive factors for pre-eclampsia after multivariate analysis were: primiparity (aOR = 51.86, 95% CI: 3.01 - 1230.96, p = 0.045), duration of exposure to partner's sperm < 3 months (aOR = 23.49, 95% CI: 1.04 - 532.01, p = 0.009), personal history of pre-eclampsia (aOR = 50.36, 95% CI: 2.06 - 1229.92, p = 0.007), and maternal history of pre-eclampsia (aOR = 6.73, 95% CI: 1.68 - 66.65, p = 0.006). **Conclusion:** The odds of pre-eclampsia increased with primiparity, duration of exposure to partner's sperm < 3 months, personal history of pre-eclampsia and maternal history of pre-eclampsia. Recognition of these predictor factors would improve the ability to diagnose and monitor women likely to develop pre-eclampsia before the onset of disease for timely interventions.

Keywords

Pre-Eclampsia, Predictive Factors, Yaoundé

1. Introduction

Pre-eclampsia is a hypertensive disorder characterised by a blood pressure greater than or equal to 140 mmHg/90mmHg and proteinuria greater than or equal to 300 mg/24h from 20 weeks of pregnancy [1]. It is a major cause of maternal and prenatal morbidity and mortality, that complicates 2% to 8% of pregnancies worldwide [1]. In Latin America and the Caribbean, hypertensive disorders are responsible for almost 26% of maternal deaths, while in Africa and Asia they contribute to 9% of deaths [1]. Although maternal mortality is much lower in high-income countries than in developing countries, 16% of maternal deaths can be attributed to hypertensive disorders [1] [2]. On the other hand, the incidence of pre-eclampsia has increased in the USA [3] [4]. This figure could be linked to an increase in the prevalence of predisposing disorders, such as chronic hypertension, diabetes and obesity [3]. Certain ethnic groups (African American and Filipino women [5] [6]) and low socioeconomic status are associated with increased risk [7]. Furthermore, severe pre-eclampsia is a major cause of maternal morbidity (stroke and capsular rupture of the liver, renal failure, hepatocellular failure, retinal detachment) and perinatal consequences, such as prematurity and intrauterine growth retardation [2]. Although generalized eclamptic seizures complicate 10,000 births in Europe [2] [3], eclampsia is 10 to 30 times more common in developing countries than in high-income countries [8]. In Cameroon, Leke *et al.* [9] in 2009 in a study conducted at the Yaoundé Gynaeco-Obstetric and Paediatric Hospital estimated its prevalence at 7.7%, of which 43.4% were primigravida. This is a frequency close to that found by Essome *et al.* [10] in 2016 in Douala. The major risk factors incriminated were: history of pre-eclampsia, multiple pregnancies, primiparity, chronic hypertension, pre-existing diabetes, and pre-existing nephropathy. Identifying women at high risk of developing pre-eclampsia would improve early diagnosis, monitoring and adequate care.

Given the poor maternal-foetal prognosis, we aimed to determine the predictive factors for pre-eclampsia and consequently, enable decision-makers to develop strategies that could provide suitable and effective solutions for early diagnosis, adequate follow-up and to limit maternal-foetal complications in our social context.

2. Methods

2.1. Study Design and Setting

This was a case-control study conducted at the Obstetrics & Gynaecology departments of the Yaoundé Gynaeco-Obstetric and Paediatric Hospital (YGOPH)

and the Yaoundé Central Hospital (YCH) from December 2021 to September 2022.

The Gynaeco-Obstetric and Paediatric Hospital is a tertiary healthcare facility situated at the Ngousso neighbourhood of Yaoundé. The Obstetrics & Gynaecology department of YGOPH is made up of a labour room with four beds, a common delivery room with two beds, a private delivery room, six common hospitalisation rooms each with six beds, twelve private hospitalisation rooms, and an outpatient consultation unit.

The Yaoundé Central Hospital is a secondary healthcare facility located at the Messa neighbourhood of Yaoundé. Its Obstetrics & Gynaecology department is made up of two hospitalisation wards, two recovery rooms, an emergency unit, a labour room, two delivery rooms (one common and one private), an operating theatre, and an outpatient consultation unit.

2.2. Study Population

The study population comprised of pregnant women at a gestational age of 20 weeks and above, admitted at the aforementioned hospitals during the data collection period. Cases included pregnant women over 20 weeks gestation with confirmed pre-eclampsia, and controls included women at same gestational age range without pre-eclampsia. Women with nephropathy during pregnancy, and those with high blood pressure without proteinuria were excluded.

2.3. Sample Size Calculation and Sampling Technique

The sample size was calculated using Schesselman's formula. Using an estimated proportion (p1) of women with pre-eclampsia of 7.7%, from a study conducted by Leke *et al.* [9] in Cameroon, proportion (p2) of women without pre-eclampsia of 92.3%, and ratio (r) of controls to cases of 4, our calculated minimum sample size was 14 for cases, and 56 for controls. The sampling technique was consecutive, involving all women who met the inclusion criteria during the data collection period.

2.4. Study Procedure

After obtaining ethical clearance from the Institutional Ethics and Research Committee of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I, and administrative authorisations to carry out the study from the Directors of the aforementioned hospitals, women who met the inclusion criteria and gave their consent to the study were recruited daily during the data collection period.

Cases of pre-eclampsia included pregnant women at gestational age of 20 weeks and above, with blood pressure greater than or equal to 140/90 mmHg associated with 24-hour proteinuria greater than or equal to 0.3 g/24 hours or proteinuria greater than or equal to ++ at the urine dipstick. After identifying women with pre-eclampsia as well as controls, they were approached by the in-

vestigator who presented the study to them and obtained their informed consent. Subsequently, they answered questions from our pre-tested questionnaire through a face-to-face interview. All maternal diseases that occurred during pregnancy and those prior to pregnancy were investigated from the antenatal records and the admission file.

2.5. Data Analysis

The data were entered at the end of the collection process into a computer and analysed using the computer software Epi info version 7.2.5.0 and SPSS version 23.0. Categorical variables were reported as frequencies and percentages. The measure of association was reported as odds ratios with corresponding 95% confidence interval and p-value. After bivariate analysis, the factors that were statistically significant were entered for multivariate logistic regression analyses to determine the predictive factors independently associated with pre-eclampsia. The level of significance was set at p-value < 0.05.

3. Results

A total of 33 cases and 132 controls were sampled, giving a study population of 165 patients.

3.1. Association between Sociodemographic Variables and Pre-Eclampsia

The sociodemographic factors associated with pre-eclampsia were assessed using bivariate logistic regression analyses. These revealed that being a student and being married were instead protective factors for pre-eclampsia (Table 1).

3.2. Association between Clinical Variables and Pre-Eclampsia

On bivariate logistic regression analysis, being primigravida (OR = 4.32, 95% CI: 1.05 - 11.32, p = 0.01), primiparity (OR = 3.95, 95% CI: 1.31 - 6.66, p = 0.04), duration of exposure to partner's sperm < 3 months (OR = 3.39, 95% CI: 1.26 - 9.05, p = 0.01), blurred vision during ANC (OR = 3.33, 95% CI: 1.83 - 15.90, p < 0.001), high blood pressure during ANC (OR = 6.19, 95% CI: 3.78 - 20.07, p < 0.001), and proteinuria during the first trimester of pregnancy (OR = 2.31, 95% CI: 1.20 - 7.23, p = 0.001) were significantly associated with increased risk of developing pre-eclampsia. On the other hand, being pauciparous (OR = 0.17, 95% CI: 0.04 - 0.56, p < 0.001), being pregnant by a partner with whom participant already had a child (OR = 0.05, 95% CI: 0.01 - 0.46, p = 0.01), and duration of exposure to partner's sperm ≥ 3 months (OR = 0.23, 95% CI: 0.08 - 0.61, p < 0.001) were protective. This is shown in Table 2.

Bivariate logistic regression analysis also revealed that personal history of pre-eclampsia (OR = 12.63, 95% CI: 4.24 - 72.06, p < 0.001), past history of intrauterine foetal death (OR = 9.56, 95% CI: 1.53 - 77.03, p = 0.01), chronic hypertension (OR = 2.63, 95% CI: 1.24 - 62.06, p < 0.001), paternal history of

Table 1. Association between sociodemographic variables and pre-eclampsia

VARIABLES	CASES N (%)	CONTROLS N (%)	OR (95% CI)	P-value
Age range (in years)				
15 - 19	8 (24.2)	9 (6.8)	1.04 (0.07 - 2.59)	0.25
20 - 24	6 (18.2)	41 (30.7)	0.36 (0.08 - 1.23)	0.09
25 - 29	2 (6.2)	49 (37.5)	0.95 (0.35 - 2.52)	0.56
30 - 34	8 (24.2)	24 (18.2)	2.57 (0.88 - 7.16)	0.06
35 - 39	9 (27.2)	7 (5.7)	2.62 (0.47 - 12.22)	0.20
40 - 44	0 (0.0)	2 (1.1)	Undefined	-
Religion				
Catholic	17 (51.6)	90 (68.2)	0.47 (0.18 - 1.24)	0.09
Protestant	10 (30.3)	24 (18.2)	2.1 (0.69 - 5.96)	0.13
Muslim	1 (3.0)	9 (6.8)	0.65 (0.03 - 4.75)	0.57
Others	5 (15.1)	9 (6.8)	2.16 (0.41 - 9.42)	0.26
Level of education				
None	0 (0.0)	3 (2.3)	Undefined	-
Primary	14 (42.4)	18 (13.6)	0.63 (0.09 - 2.79)	0.44
Secondary	9 (27.3)	59 (44.3)	1.51 (0.58 - 3.95)	0.27
University	10 (30.3)	52 (39.8)	0.71 (0.25 - 1.90)	0.33
Occupation				
Civil servant	8 (24.2)	12 (9.1)	2.22 (0.53 - 8.15)	0.19
Private worker	7 (21.2)	30 (21.6)	0.81 (0.21 - 2.58)	0.49
Student	7 (21.2)	57 (43.2)	0.21 (0.05 - 0.71)	**0.01***
Housewife	5 (15.2)	27 (20.5)	2.22 (0.77 - 6.11)	0.10
Trader	5 (15.2)	3 (2.3)	4.3 (0.42 - 42.62)	0.18
Informal sector	1 (3.0)	3 (2.3)	1.35 (0.05 - 13.27)	0.60
Marital status				
Single	20 (60.6)	72 (54.5)	2.44 (0.08 - 0.71)	0.05
Married	12 (36.4)	43 (33.0)	0.25 (0.93 - 6.44)	**0.01***
Widow	0 (0.0)	2 (1.1)	Undefined	-
Cohabiting	1 (3.0)	15 (11.4)	1.73 (0.43 - 6.05)	0.29

*Significant P-value; N = frequency; CI = Confidence interval; OR = Odds ratio.

Table 2. Association between clinical variables and pre-eclampsia.

VARIABLES	CASES N (%)	CONTROLS N (%)	OR (95% CI)	P-value
Gravidity				
Primigravida	10 (30.3)	32 (24.2)	4.32 (1.05 - 11.32)	**0.01***
Multigravida	14 (42.4)	78 (59.1)	0.58 (0.22 - 1.50)	0.18
Grand-multigravida	9 (27.3)	22 (16.7)	0.06 (0.03 - 1.17)	0.10
Parity				
Primiparous	17 (51.5)	38 (28.8)	3.95 (1.31 - 6.66)	**0.04***
Pauciparous	7 (21.2)	64 (48.5)	0.17 (0.04 - 0.56)	**<0.001***
Multiparous	4 (12.1)	16 (12.1)	0.27 (0.03 - 3.81)	0.14
Grand-multiparous	5 (15.2)	14 (10.6)	3.29 (0.95 - 10.60)	0.05

Continued

Inter-gestational age				
<24 months	5 (15.2)	26 (19.7)	0.70 (0.21 - 2.06)	0.36
24 - 48 months	11 (33.3)	44 (33.3)	1.63 (0.79 - 6.72)	0.26
>48 months	17 (51.5)	62 (47.0)	1.43 (0.49 - 4.72)	0.36
Type of partner				
Former	6 (18.2)	130 (97.7)	0.05 (0.01 - 0.46)	**0.01***
New	27 (81.8)	2 (2.3)	8.70 (0.62 - 259.07)	0.10
Duration of exposure to partner's sperm				
<3 months	18 (54.5)	34 (25.8)	3.39 (1.26 - 9.05)	**0.01***
≥3 months	15 (45.5)	98 (74.2)	0.23 (0.08 - 0.61)	**<0.001***
Symptoms/signs during ANC				
Headache	8 (24.2)	66 (50.0)	0.19 (0.07 - 0.52)	0.10
Blurred vision	11 (33.3)	3 (2.3)	3.33 (1.83 - 15.90)	**<0.001***
Epigastric pains	3 (9.1)	19 (14.4)	0.57 (0.12 - 2.02)	0.31
Tinnitus	2 (6.1)	4 (3.0)	0.22 (0.05 - 1.99)	0.21
High blood pressure	8 (24.2)	3 (2.3)	6.19 (3.78 - 20.07)	**<0.001***
Proteinuria during first trimester	6 (18.2)	1 (0.8)	2.31 (1.20 - 7.23)	**0.001***
Past obstetric history				
History of pre-eclampsia	9 (27.3)	1 (0.8)	12.63 (4.24 - 72.06)	**<0.001***
History of IUGR	2 (6.1)	0 (0.0)	Undefined	-
History of IUFD	6 (18.2)	2 (1.5)	9.56 (1.53 - 77.03)	**0.01***
Past medical history				
Diabetes mellitus	1 (3.0)	0 (0.0)	Undefined	-
Cardiopathies	0 (0.0)	1 (0.8)	Undefined	-
Chronic hypertension	6 (18.2)	1 (0.8)	2.63 (1.24 - 62.06)	**<0.001***
Use of COC	9 (27.3)	26 (19.7)	1.65 (0.60 - 4.36)	0.22
Obesity	6 (18.2)	26 (19.7)	0.89 (0.29 - 2.51)	0.53
Stress	3 (9.1)	35 (26.5)	0.24 (0.05 - 0.82)	0.06
Alcohol consumption	3 (9.1)	5 (3.8)	2.83 (0.32 - 19.99)	0.26
Paternal family history				
Diabetes mellitus	8 (24.2)	70 (53.0)	0.15 (0.05 - 0.41)	0.07
Hypertension	17 (51.5)	18 (13.6)	4.67 (1.70 - 12.69)	**<0.001***
Obesity	2 (6.1)	0 (0.0)	Undefined	-
Maternal family history				
Diabetes mellitus	4 (12.1)	27 (20.3)	0.5 (0.14 - 1.57)	0.19
Pre-eclampsia	16 (48.5)	5 (3.8)	16.6 (4.73 - 59.71)	**<0.001***
Chronic hypertension	5 (15.1)	56 (42.4)	0.17 (0.05 - 0.49)	0.08
Gestational hypertension	1 (3.0)	0 (0.0)	Undefined	-

*Significant P-value; N = frequency; CI = Confidence interval; OR = Odds ratio; ANC = Antenatal consultation; IUGR = Intrauterine growth retardation; IUFD = Intrauterine foetal death; COC = Combined oral contraceptive.

hypertension (OR = 4.67, 95% CI: 1.70 - 12.69, p < 0.001), and maternal history of pre-eclampsia (OR = 16.6, 95% CI: 4.73 - 59.71, p < 0.001) were equally associated with increased risk of developing pre-eclampsia, as shown in Table 2.

3.3. Factors Predictive for Pre-Eclampsia on Multivariate Logistic Regression Analysis

The final multivariate logistic regression analysis revealed that primiparity (aOR = 51.86, 95% CI: 3.01 - 1230.96, p = 0.045), duration of exposure to partner's sperm < 3 months (aOR = 23.49, 95% CI: 1.04 - 532.01, p = 0.009), personal history of pre-eclampsia (aOR = 50.36, 95% CI: 2.06 - 1229.92, p = 0.007), and maternal history of pre-eclampsia (aOR = 6.73, 95% CI: 1.68 - 66.65, p = 0.006) were significantly associated with increased risk of developing pre-eclampsia (Table 3).

4. Discussion

The current study established that primiparity was a predictive factor statistically associated with pre-eclampsia. This is similar to the findings of Mboudou *et al.* [11] in 2009, and Foumane *et al.* [12] in 2018 in Cameroon. Genest *et al.* [13] in 2012 in France made the same observation.

A personal history of pre-eclampsia was significantly associated with the occurrence of pre-eclampsia. The risk was multiplied in this case by 50.36. This is in line with other studies worldwide [3] [4] [13] [14] [15] [16].

Maternal history of pre-eclampsia was found to be strongly associated with pre-eclampsia in our study, multiplying the risk by 6.73. This is supported by the studies of Mboudou *et al.* [11] in 2009 and Wheeler *et al.* [15] in 1995 which go in the same direction.

A duration of exposure to partner's sperm of less than three months before conception is a risk factor for pre-eclampsia found in practically all literature [13] [15] [17]. We also found it as a factor associated with pre-eclampsia in our study. A duration of exposure of less than 3 months before conception increased the risk of developing pre-eclampsia by 23.49.

Literatures from Africa revealed that women that were primigravid were more likely to develop pre-eclampsia compared to those that were multigravida [4]

Table 3. Factors predictive for pre-eclampsia.

VARIABLES	aOR	95% CI	P-value
Primigravida	4.13	0.43 - 39.87	0.220
Primiparity	51.86	3.01 - 1230.96	**0.045***
Duration of exposure to sperm < 3 months	23.49	1.04 - 532.01	**0.009***
Blurred vision during ANC	0.06	0.002 - 1.85	0.109
High blood pressure during ANC	6.34	0.59 - 67.57	0.126
Proteinuria during first trimester	1.85	0.22 - 15.70	0.572
Personal history of pre-eclampsia	50.36	2.06 - 1229.92	**0.007***
Past history of IUFD	1.34	0.16 - 11.16	0.788
Chronic hypertension	23.17	0.65 - 832.43	0.085
Paternal history of hypertension	1.26	0.02 - 96.74	0.917
Maternal history of pre-eclampsia	6.73	1.68 - 66.65	**0.006***

*Significant P-value; CI = Confidence interval; aOR = Adjusted Odds ratio; ANC = Antenatal consultation; IUFD = Intrauterine foetal death.

[15] [18]. Our study did not show such an association on multivariate analysis, even though there was an association on bivariate analysis. This difference might be due to a low frequency of primigravid women among our study participants.

Although studies by Leeners *et al.* [2] and Saftlas *et al.* [14] showed a significant association between chronic hypertension and occurrence of pre-eclampsia, our study did not show such an association on multivariate analysis. However, there was an associated increased risk on crude analysis. Failure of our study to show an association between chronic hypertension and occurrence of pre-eclampsia might be due to a small number of women with chronic hypertension within our study sample.

Further, paternal history of hypertension was not associated with occurrence of pre-eclampsia in our study on multivariate analysis even though there was an association on bivariate analysis. It is contrary to the study of Wheeler *et al.* [15]. This contradiction might be due to a low frequency of women with paternal history of hypertension in our study sample.

On bivariate analysis, a past history of IUFD was statistically associated with the occurrence of pre-eclampsia but there was no statistically significant association on multivariate analysis. This is discordant with findings from other researches [2] [14].

No statistical association was found between the maternal age, level of education, religion, alcohol consumption, use of combined oral contraceptives, obesity, and inter-gestational age, and the occurrence of pre-eclampsia.

5. Limitations

Control cases were not followed until the postpartum period to rule out postpartum pre-eclampsia. This research might also be subjected to recall bias, since participants might not have remembered and reported past events correctly.

6. Conclusion

In conclusion, primiparity, duration of exposure to partner's sperm < 3 months, personal history of pre-eclampsia and maternal history of pre-eclampsia were significantly associated with increased risk of developing pre-eclampsia. It is essential that pregnant women at risk of pre-eclampsia should be identified and high-quality antenatal care given in order to minimize the complications of pre-eclampsia both for the mother and the foetus.

Conflicts of Interest

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

References

[1] SFAR CNGOF (2020) Recommandations formalisées d'experts. Prise en charge de la patiente avec prééclampsie sévère.

https://gynerisq.fr/wp-content/uploads/2021/05/2020_SFAR_CNGOF_Recos_-preeclampsie_severe

[2] Leeners, B., Rath, W., Kuse, S. and Lee, C.J. (2006) New Aspects of a Classical Risk Factor for Hypertensive Disorders in Pregnancy. *Clinical Research*, **111**, 81-86. https://doi.org/10.1042/CS20060015

[3] WHO (1988) International Collaborative Study of Hypertensive Disorders of Pregnancy. Geographic Variation in the Incidence of Hypertension in Pregnancy. *American Journal of Obstetrics and Gynecology*, **158**, 80-83. https://doi.org/10.1016/0002-9378(88)90782-X

[4] Lansac, J., Beger, C. and Magnin, G. (1990) HTA et grossesse pour le praticien. 2e édition, Masson, Paris, 192-197.

[5] Toure, I., Brah, F. and Prual, A. (1997) Hypertension artérielle et grossesse au Niger , étude cas/témoins à propos de 70 cas. *Medecine d'Afrique Noire*, **4**, 44-48.

[6] Bah, A., Diallo, M., Diallo, A. and Keita, N. (2000) Hypertension artérielle et grossesse, aspect épidémiologique et facteurs de risque. *Medecine d'Afrique Noire*, **47**, 422-500.

[7] Faye, A., Picau, A., Ogowet-Igumu, N., Nlome, N. and Nicolas, P. (1991) L'éclampsie au Centre hospitalier de Libreville 53 cas pour 41 285 accouchements de 1985 à 1989. *Revue française de Gynécologie et d'obstétrique*, **86**, 503-510.

[8] Leke, R. (1987) Outcome of Delivery at Central Maternity Yaounde. *Annales Universitaires des Sciences de la Santé*, **4**, 322-330.

[9] Leke, R., Doh, A., Minkande, Z., Mboudou, E., Beyiha, G. and Messi, J. (2009) Evalauation de la prise en charge de la prééclampsie sévère en réanimation, cas de l'Hôpital Gynéco-Obstétrique et Pédiatrique de Yaoundé. Thèse de doctorat en medicine, Université de Yaoundé I, Yaoundé, 8-54.

[10] Essome, H., Mve Koh, V., Foumane, P., Ekono, M., Boten, M. and Tocki, T. (2019) Prééclampsie à l'Hôpital Laquintinie de Douala, enquête de prévalence et de morbidité de 2010 à 2015. *Health Sciences and Disease*, **5**, 1-5.

[11] Mboudou, E., Foumane, P., Priso, E., Dohbit, J., Minkande, J., Nkengafac, W., *et al.* (2009) Hypertension au cours de la grossesse, Aspects cliniques et épidémiologiques à l'Hôpital Gynéco-Obstétrique et Pédiatrique de Yaoundé, Cameroun. *Clinics in Mother and Child Health*, **6**, 1-7. https://doi.org/10.4303/cmch/C101967

[12] Foumane, P., Dohbit, J., Meka, E., Nkada, M., Minkande, J. and Mboudou, E. (2015) Etiologies de la mortalité maternelle à l'Hôpital Gynéco-Obstétrique et Pédiatrique de Yaoundé, une série de 58 décès. *Health Sciences and Disease*, **15**, 1-7

[13] Genest, D., Falcao, S., Gutkowska, J. and Lavoie, J. (2012) Impact of Exercise Training on Preeclampsia, Potential Preventive Mechanisms. *Hypertens Dallas Tex*, **60**, 1104-1109. https://doi.org/10.1161/HYPERTENSIONAHA.112.194050

[14] Saftlas, A., Hsia, J. and Atrash, H. (2002) Principales Complications, Hypertension artéRielle. *Journal of Gynecology Obstetrics and Human Reproduction*, **31**, S28-32.

[15] Wheeler, T., Elcock, C. and Anthony, F. (1995) Angiogenesis and the Placental Environment. *Placenta*, **16**, 289-296. https://doi.org/10.1016/0143-4004(95)90115-9

[16] Binder, J., Kalafat, E., Palmrich, P., Pateisky, P. and Khalil, A. (2021) Angiogenic Markers and Their Longitudinal Change for Predicting Adverse Outcomes in Pregnant Women with Chronic Hypertension. *American Journal of Obstetrics and Gynecology*, **225**, 305.e1-305. https://doi.org/10.1016/j.ajog.2021.03.041

[17] Duley, L., Hendersont, D. and Knight, M. (2001) Antiplatelet Drugs for Prevention of Pre-Eclampsia and Its Consequences, Systematic Review. *British Medical Journal*,

322, 329-333. https://doi.org/10.1136/bmj.322.7282.329

[18] Farzaneh, F., Tavakolikia, Z. and Soleimanzadeh Mousavi, S.H. (2019) Assessment of Occurrence of Preeclampsia and Some Clinical and Demographic Risk Factors in Zahedan City in 2017. *Clinical and Experimental Hypertension*, **41**, 583-588. https://doi.org/10.1080/10641963.2018.1523919

List of Abbreviations

ANC: Antenatal consultations;
aOR: Adjusted Odds ratio;
CI: Confidence interval;
COC: Combined oral contraceptives;
IUFD: Intrauterine foetal death;
IUGR: Intrauterine growth retardation;
MM-YCH: Main maternity of the Yaoundé Central Hospital;
OR: Odds ratio;
SPSS: Statistical Package of Social Sciences;
YGOPH: Yaoundé Gynaeco-Obstetric and Paediatric Hospital.