Research article

Risk Factors for Pre-eclampsia in Multiparous Women in Lagos, Nigeria

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Abstract

Objectives: The study was aimed at examining the risk factors for pre-eclampsia in the multiparous women in Lagos, Nigeria.
Methods: This is a cross-sectional case-control study designed to examine the risk factors for pre-eclampsia in the multiparous women in Lagos, Nigeria. Structured questionnaires were administered to eligible participants (pre-eclamptic and normotensive) who delivered at the two teaching hospitals in Lagos during the study period. Information obtained was entered into computer and analysis was done using Epi-Info 2008 version 3.5.1 statistical software package.
Results: A total of 350 multiparous women participated in the study. 150 of them were preeclamptic while the remaining 200 who were normotensive were used as control. Monogamous relationship, change of spouse, age of 40 years and above, previous pre-eclampsia, chronic hypertension, diabetes, family history of hypertension and unbooked status were the risk factors found to be associated with pre-eclampsia in multiparous women in the study (P≤0.05).
Conclusion: Identified risk factors were not different from previously identified factors in other studies. A call for early antenatal booking, good control of hypertension and diabetes cannot be overemphasized in the prevention of preeclampsia/eclampsia.
Keywords: Eclampsia, Lagos, multiparous, preeclampsia

1. Introduction

Pre-eclampsia is one of the most important causes of maternal and perinatal mortality and morbidity in both developing and developed countries[1,2]. Pre-eclampsia is a multi-systemic disorder that is usually associated with elevated blood pressure and proteinuria. When severe, it can involve the women's liver, kidneys, blood clotting system or brain[3].

Pre-eclampsia is a syndrome with maternal and fetal manifestations. It is a disorder characterized by vasoconstriction, metabolic changes, endothelial dysfunction, and activation of the coagulation cascade in conjunction with an inflammatory response[4]. Pre-eclampsia complicates 3-5% of first pregnancies and 1% of subsequent pregnancies with around 5-10% of cases being severe[2]. In Nigeria, a prevalence rate of 5.6% has been reported[5]. Globally, an estimated 585,000 women die each year from complications of pregnancy and childbirth. With 99% of these deaths occurring in developing countries, thirteen percent are due to hypertensive disorders of pregnancy particularly eclampsia[6].

In a 10-year review (1987-1996) of maternal deaths in Lagos, pre-eclampsia was the second most common cause of maternal deaths accounting for 16.4% of all maternal deaths with a case fatality rate of 21.0% [7]. Pre-eclampsia is also associated with high rates of preterm delivery, intrauterine growth restriction and perinatal deaths worldwide[8]. The aetiology of pre-eclampsia remains unknown, although several risk factors have been identified. These include nulliparity, previous pre-eclampsia, obesity or high body mass index[9], multiple gestation[10], black race, low socio-economic status, underlying medical conditions such as chronic hypertension and diabetes[11]. In addition to these are advanced maternal age[12], late prenatal care, previous child with low birth weight[11], long interval between birth and subsequent conception[13,14], a change in spouse or primipaternity[12,15] and a history of pre-eclampsia[11,12,15].

Women who have pre-eclampsia in a first pregnancy have seven times the risk of pre-eclampsia in a second pregnancy[11,16-18]. Women with pre-eclampsia in their second pregnancy are also more than seven times more likely to have a history of pre-eclampsia in their first pregnancy than women in their second pregnancy who do not develop pre-eclampsia[19,20]. Risk factors for pre-eclampsia have been studied extensively in many settings. However, there has been little work done to address this topic in Nigerian pregnant multiparous women. A study carried out in Lagos reported risk factors in both primigravida and multipara and did not look at them separately[21]. The objective of this study therefore was to identify maternal demographic and clinical characteristics associated with the development of pre-eclampsia in multiparous women in Lagos, Nigeria and to determine whether they differ from those in women from other settings. The elucidation of these risk factors may help in finding the possible interventions for reducing the prevalence of the disease.

2. Materials & Methods

This hospital based cross-sectional case-control study was conducted in the two teaching hospitals in Lagos, Nigeria over a period of 12 months. The minimum sample size was calculated using the statistical formula by Fisher[22]. A total number of 350 women were selected by consecutive sampling method for the study.

The case-group comprised of 150 multiparous women who had pre-eclampsia during the study period. Pre-eclampsia (ICD – 10 Code 014) [23, 24] in this study is defined as a diastolic blood pressure of at least 90 mmHg on two or more consecutive occasions > 4 hours apart or a diastolic blood pressure of at least 110mmHg on any one occasion plus significant proteinuria (one 24 hours urine collection with a total protein excretion of at least 300mg or > 1+ on urine dipstick).

The control-group comprised of multiparous women who delivered about the same time as the case-group and were normotensive (without proteinuria). A pre-tested and standardized questionnaire was administered to eligible women to document relevant information. Details of blood pressure and urinalysis were obtained from their antenatal records. Information obtained was then entered into a computer and analysis done using Epi-Info 2008 version 3.5.1 statistical software package. The risk factors of pre-eclampsia were obtained using crude odd ratio and confidence interval. All significance was reported at P ≤ 0.05.

Ethical approval were obtained from the two teaching hospitals' Health Research and Ethics committee prior to the commencement of the study and written consent obtained from each participant before involvement in the study.

3. Results

There were a total of 350 multiparous women included in the analysis. One hundred and fifty (150) cases of pre-eclampsia were identified while 200 women were chosen as controls (normotensive without proteinuria).

Table 1 showed similarities in demographic characteristics of the women in the case and control groups as there were no statistically significant difference reported (P≤0.05).

Table 2 showed the association between the maternal demographic factors and pre-eclampsia with the age group of above 40 years having a slightly increased risk of pre-eclampsia (OR-1.59; 95% CI-0.47-5.61) although this was not statistically significant (P=0.041); however the age group 20-29 years was associated with reduced risk of pre-eclampsia (OR-0.29: 95% CI-0.18-0.46). No relationship was established between educational status and the occurrence of pre-eclampsia in the study groups (P ≤0.05).

Table 3 showed that being in a monogamous family setting increases the risk of pre-eclampsia compared to a polygamous relationship by 2 folds (95% CI-1.01-5.50; P=0.037). It was also revealed that change of spouse or partner increases the individual's risk of pre-eclampsia by 4 folds (95% CI-1.43-14.00; P = 0.002). There is also a 11-fold increased risk in those with family history of hypertension (95% CI-5.12-22.34; P = 0.00001)

In table 4, it was shown that previous history of pre-eclampsia was a significant risk factor for pre-eclampsia (P=0.00008). Women with chronic hypertension were also at increased risk of developing pre-eclampsia (P=0.0002). History of diabetes in the participants was associated with more than seven folds increase risk of having the disease when pregnant. (95%CI-1.94-32.36; P=0.0004).

As revealed in table 5, an unbooked status (P=0.00001) and multiple pregnancy (P=0.043) were both associated with about three times the risk of developing pre-eclampsia. None of the women in the study were however found to have a history of cigarette smoking during the data collection period.

Table 1: Matching of demographic characteristics of pre-eclamptic and normotensive pregnant women in the study (n=350)

Characteristics	Case-150 Pre-eclamptic N (%)	Control-200 Normotensive N (%)	P-value
Maternal Age (years)			
20-29	10 (6.7)	5 (2.5)	
30-39	98 (65.3)	78 (39.0)	0.075
≥ 40	42 (28.0)	117 (58.5)	
Educational status			
None	30 (20.0)	64 (32.0)	
Primary	10 (6.7)	16 (8.0)	
Secondary	10 (6.7)	20 (10.0)	0.544
Tertiary	78 (52.0)	78 (39.0)	
Vocational	22 (14.6)	22 (11.0)	

Table 2: Association between maternal demographic factors and pre-eclampsia (n=350)

Factors	Case-150 Pre-eclamptic N (%)	Control-200 Normotensive N (%)	Crude odd ratio	95% Confidence Interval	P-value
Maternal age (years.)					
20-29	10 (6.7)	5 (2.5)	0.29	0.18-0.46	0.111
30-39	98 (65.3)	78 (39.0)	1.00	Ref	Ref
≥ 40	42 (28.0)	117 (58.5)	1.59	0.47-5.61	0.041
Educational status					
None	30 (20.0)	64 (32.0)	0.94	0.36-2.46	0.885
Primary	10 (6.7)	16 (8.0)	1.25	0.36-4.31	0.689
Secondary	10 (6.7)	20 (10.0)	1.00	Ref	Ref
Tertiary	78 (52.0)	78 (39.0)	2.00	0.82-4.93	0.094
Vocational	22 (14.6)	22 (11.0)	2.00	0.69-5.87	0.155

Table 3: Association between maternal social factors and pre-eclampsia (n=350)

Factors	Case-150 Pre-eclamptic N (%)	Control-200 Normotensive N (%)	Crude odd ratio	95% Confidence Interval	P-value
Family setting					
Monogamy	132 (88.0)	189 (94.5)	2.34	1.01-5.50	0.037
Polygamy	18 (12.0)	18 (5.5)			
Change of spouse					
Yes	15 (10.0)	5 (2.5)	4.33	1.43-14.00	0.002
No	135 (90.0)	195 (97.5)			

Table 4: Association between maternal medical factors and pre-eclampsia (n=350)

Factors	Case-150 Pre-eclamptic N (%)	Control-200 Normotensive N (%)	Crude odd ratio	95% Confidence Interval	P-value
Previous history of pre-eclampsia					
Yes	25 (16.7)	5 (2.5)	7.80	2.74-23.90	0.00008
No	125 (83.3)	195 (97.5)			
Chronic Hypertension					
Yes	22 (86.7)	5 (2.5)	6.70	2.33-20.76	0.0002
No	128 (13.3)	195 (97.5)			
Diabetes mellitus					
Yes	15 (10.0)	3 (1.5)	7.30	1.94-32.36	0.0004
No	135 (90.0)	197 (98.5)			
Family history of hypertension					
Yes	120 (86.7)	25 (95.0)	28.00	15.12-52.34	0.00001
No	30 (13.3)	175 (5.0)			

Table 5: Association between maternal obstetric factors and pre-eclampsia (n=350)

Factors	Case-150 Pre-eclamptic N (%)	Control-200 Normotensive N (%)	Crude odd ratio	95% Confidence Interval	P-value
Booking status					
Unbooked	50 (33.3)	28 (4.0)	3.07	1.76-5.37	0.00001
Booked	100 (66.7)	172 (96.0)			
Number of fetus(es)					
Single	130 (86.7)	190 (95.0)	2.92	1.25-6.95	0.043
Multiple	20 (13.3)	10 (5.0)			

4. Discussion

Several epidemiological studies have considered the association of maternal demographic characteristics and the risk of pre-eclampsia. The result of this study indicates that maternal age up 40 years was associated with development of pre-eclampsia. Maternal age below 30 years appeared to be protective in this study. This finding correlates with other similar studies[2,7]. Maternal level of education was found to have no significant relationship to the development of pre-eclampsia just like previous studies where the level of education was not found to be a significant risk factor[12, 25].

The impact of change of spouse in pre-eclampsia is well established. It has been reported in some studies that multiparous women who had a change of spouse before the index pregnancy were found to have an increased risk of pre-eclampsia[12,15]. This perhaps suggests a loss of protective effect of multiparity. Similar findings in other studies have led to the suggestion that the term 'primipaternity' rather than primigravidity should be used to describe the epidemiological standard of pre-eclampsia[15,26].

Multi-fetal gestation appeared to significantly increase the risk of pre-eclampsia in this study. This is in agreement with other published studies[22,27]. Hyperplacentosis with a greater demand for blood and oxygen and an increase in maternal cardiac output have been proposed as the underlying mechanism to explain the increased incidence of pre-eclampsia in twin pregnancy[26].

A seven times increased risk of pre-eclampsia with previous pre-eclampsia observed in this study is in agreement with the reported risks stated in other published studies[11,26]. This risk was greatest among women who had the disease relatively early and had delivery remote from term[13,21]. Therefore, women who had pre-eclampsia in previous pregnancies will require careful monitoring in subsequent pregnancies.

The effect of diabetes and chronic hypertension in increasing the risk of pre-eclampsia were reported in this study in similarities to the reports from other studies[11,13, 27]. It was also observed that family history of hypertension predisposes an individual to hypertension and increases the risk of pre-eclampsia. This had also been elucidated by other workers[12,13].

The booking status of the patient were appraised and observed that booking antenatally perhaps confer a protection to pre-eclampsia, probably because of close monitoring of the patient from the early stage and effort at preventing those with predisposing factors to pre-eclampsia from becoming preeclamptic by early institution of certain preventionary measures in pregnancy.

Cigarette smoking is reported in many studies to reduce the risk of pre-eclampsia[27,28]. However, this could not be demonstrated as none of the women volunteered a history of smoking.

A potential limitation of our analysis is the lack of data on the pre-pregnancy BMI of the study participants and the refusal of any our participants to volunteer any positive history of cigarette smoking.

The results from this study have shown that chronic hypertension, diabetes, previous pre-eclampsia, multi-fetal gestation and change of spouse (primipaternity) are all significant risk factors for pre-eclampsia among multiparous women in Lagos, South-West Nigeria. These risk factors are not very different from what had been reported in various studies conducted outside Nigeria. Early booking status, good control of chronic hypertension and diabetes before and during pregnancy could be positive steps toward the primary prevention of this killer disease.

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Conflicts of interest

The authors declare that there is no conflict of interest.

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