

Identifiable Risk Factors and Immediate Outcome of Preeclampsia/Eclampsia in the Pregnant Women Managed at Federal Teaching Hospital Katsina, North-West Nigeria

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Abstract:

Introduction: Preeclampsia is a multi-organ systemic disorder that is responsible for a significant rate of maternal and perinatal morbidity and mortality worldwide. Despite this, there are limited studies on the prevalence of pre-eclampsia/eclampsia in Nigeria.

Objective: To estimate the prevalence of preeclampsia/eclampsia, identify their possible associated risk factors and the fetomaternal outcome.

Design: This is a cross sectional study carried out at the obstetrics unit of Federal teaching Hospital (FTH) Katsina.

Methods: A Total of 114 participants were enrolled and their socio-demographic, related medical information and pregnancy outcome were obtained using a standard proforma and analyzed with SPSS. Data were interpreted using tables, percentages and Chi- square.

Results: There was a total of 114 participants with Preeclampsia /Eclampsia and a total of 1062 delivery during the study, which gives a prevalence of 10.7%. There were 90 patients with Preeclampsia and 24 patients with Eclampsia giving an isolated prevalence of 8.5% and 2.2% for Preeclampsia and Eclampsia respectively. The mean age of the participants was 25.78±8.3 years, while most of the participants (38.6%) fall below 21 years. Majority of the participants (35.1%) had no formal education. Largest percentage of the participants (38.6%), were Primigravida and most (69.3%) were booked. Majority of these patients (57%) resides in the rural community with most of them (71.1%) having low socioeconomic status. The most common family risk factor was hypertension with 45.3%. There was statistical significant association between eclampsia and previous preeclampsia with a P-value of 0.01. Abruption placenta (21.9%) was the most common complication and larger proportion of the babies (64.9%), were delivered preterm. Perinatal mortality rate was 17.5% with a higher perinatal mortality among Eclamptic patient (Odd ratio of 2.0). The table also shows that most babies (71.1%) had SCBU admission.

Conclusion: There was high prevalence of preeclampsia/eclampsia among the participants with associated increased rate of Caesarean Section, perinatal morbidity and mortality.

Keywords: fetomaternal outcome; preeclampsia; eclampsia; preterm; perinatal mortality

Introduction

Preeclampsia is a disorder of pregnancy,¹ and is one of the leading causes of maternal morbidity and mortality in the world. Preeclampsia is hypertension that generally occurs after 20 weeks of gestation along with proteinuria. When proteinuria is absent, preeclampsia is diagnosed in association with liver dysfunction, thrombocytopenia, pulmonary edema, new onset of kidney dysfunction, or new-onset of cerebral or visual disturbances. It can cause severe morbidity, chronic disability, and even death of mothers and babies. Moreover, it is linked with an increased risk of cardiovascular diseases and type 2 Diabetes.^[1]

Preeclampsia is a multi-organ system disorder of pregnancy and is responsible for a significant rate of maternal morbidity and mortality worldwide.^[1] The global prevalence of all pre-eclampsia in the years 2002–2010 was estimated at 4.6% of deliveries but reported regional rates varied between 1% and 5.6%.^[2] Where reported, the prevalence of preterm preeclampsia is <1%.² The prevalence of pre-eclampsia is generally reported as lower in low-income and middle-income countries.^[2] The prevalence of preeclampsia in developing countries ranges from 1.8 to 16.7%. For instance, prevalence of preeclampsia occurs in 10% of pregnancies in African women,

which is significantly higher than the global average of approximately 2%. [3]

Globally preeclampsia is one of the primary cause of 830 daily maternal deaths, 550 occurred in Sub-Saharan Africa and 180 in South Asia, compared to 5 in developed countries. The risk of a woman in developing country dying from a maternal-related cause during her life time is about 33 times higher compared to woman living in a developed country.[3]

In West African countries such as Ghana it account for about 15-25% of maternal death,[2] Nigeria has high maternal mortality ratio (512 per 100,000 live births), high fertility rate (5.3 children per woman), and high infant mortality rate (67 deaths per 1000 live births).[4] A Nationwide cross-sectional study of 998 maternal deaths and 1451 near misses in public tertiary hospitals in Nigeria showed that Preeclampsia/Eclampsia was the highest contributor to maternal deaths being the cause of maternal deaths in 28.3% of cases.[4] The incidence varies amongst different districts, religions, countries and hospitals.[5]

Eclampsia alone contributed to a prevalence of 7.3% in UCTH, Calabar state in South-South Nigeria.[6], 24.5% incidence in Yenagoa, Bayelsa state South-South Nigeria[7] and 42.2% of maternal deaths in Sokoto, Northern Nigeria.[4] and 40-41% in Kano Northern Nigeria.[8]

Multiple risk factors are known for the development of preeclampsia and eclampsia, including primiparity, pregnancy at extreme of ages, chronic hypertension, diabetes, multiple gestations, prior history of preeclampsia, poor socioeconomic conditions, and low education level, multi parity, thrombophilia, systemic lupus erythematosus, body mass index of more than 30, antiphospholipid antibody syndrome, kidney disease, assisted reproductive technology, obstructive sleep apnea, hydatidiform mole, thyroid disease, collagen vascular diseases.[9-11]

The pathophysiology of pre-eclampsia is not fully understood and this disorder presents as a clinical syndrome with a wide spectrum. Early onset pre-eclampsia is generally considered as a defect in placentation whilst late onset pre-eclampsia is more often attributed to a range of interacting factors including normal placental senescence and a genetic predisposition to cardiovascular and metabolic disease. Poor placental function has repeatedly been associated with oxidative stress. [12]

Worldwide, an estimated 4 million women are diagnosed with pre-eclampsia (previously called toxemia) each year, causing the deaths of >70,000 women and 500,000 babies. Women who survive pre-eclampsia have reduced life expectancy, with increased risks of stroke, cardiovascular disease and diabetes, while babies from a pre-eclamptic pregnancy have increased risks of preterm birth, perinatal death, neurodevelopmental delay, and cardiovascular and metabolic disease later in life. Worldwide, >300 million women and children are estimated to be at increased risk of chronic health problems due to previous exposure to pre-eclampsia.[2] Preeclampsia is associated with pregnancy related complications. Approximately 12% of women with severe pre-eclampsia will develop HELLP syndrome, characterized by hemolysis, elevated liver enzymes and low platelet count, this leads to liver ischemia that can cause intrahepatic hemorrhage and subcapsular hematoma. This complication is associated with a significant risk of maternal mortality. [13,14]

Acute renal failure is a rare complication of pre-eclampsia, with an estimated incidence of 1 in 10 000–15 000 pregnancies. Obstetric hemorrhage is a much more common precipitating factor in this population.[13] Other maternal complications of Pre-eclampsia include cerebral oedema, intracranial haemorrhage, blindness, stroke, pulmonary oedema, aspiration pneumonitis, pneumonia, renal failure, abruptio placentae, post-partum haemorrhage, disseminated intravascular coagulopathy, puerperal sepsis, and foetal complications include reduce fetoplacental circulation leading to

intra uterine growth retardation, foetal distress, preterm delivery, birth asphyxia, prematurity syndrome leading to increase in maternal and perinatal deaths.[14,15]

Long term maternal complications include recurrence of pre eclampsia and eclampsia in future pregnancies, chronic hypertension, chronic diabetes [16] and foetal complications include cardiovascular disease and double risk of stroke in children born to pre eclamptic mothers, preeclampsia is consistently associated with high blood pressure and body mass index of as early as 4-10 years of age.[17]

Although the maternal mortality has been reduced significantly, the perinatal mortality still remains very high even in the developed countries (7–10%). In developing countries, the perinatal mortality remains to the extent of about 20%, about 50% of which being stillborn.[15]

Though mortality has been reduced significantly in the advanced countries, it still remains high in the developing world.[16]

Despite the high rate of pre-eclampsia and eclampsia related maternal and perinatal morbidity and mortality in developing countries like Nigeria, there are limited studies on the prevalence of pre-eclampsia and eclampsia, it is risk factors peculiar to our society as well as immediate outcome especially in the northern part of Nigeria. Different populations and ethno-geographical groups may have different prevalence and risk factors of pre-eclampsia and eclampsia. Most studies from Nigeria dealt with the incidence on eclampsia, and these vary in different geographical areas. It is as low as 0.3 per 100 delivery in Calabar, Southern Nigeria to as high as 5-9% per 100 delivery in Kano, Northern Nigeria. The cumulative incidence of pre-eclampsia in Nigeria is not known, it has never been evaluated on a large randomized trial to give a true National incidence.[18]

Knowing the gravity of prevalence of pre-eclampsia and understanding the risk factors peculiar to our society as well as the immediate outcome is important for prevention and treatment of pre-eclampsia and its complications and ultimately reducing maternal and perinatal morbidity and mortality. Therefore, this study is being conducted to determine the prevalence, risk factors and immediate outcome of pre-eclampsia among the women presenting to obstetric units, Federal Teaching Hospital Katsina, this will provide evidence based information for prevention and improvement in health care approach.

Subjects And Methods

Study Design: This was an institutional-based cross-sectional study.

Study Objectives: The aim of this study is to determine the prevalence, risk factors and immediate outcome of preeclampsia among women that present to Obstetric units, Federal Teaching Hospital Katsina.

Study Area: The study was conducted at the Department of Obstetrics and Gynecology, Federal Teaching Hospital Katsina, in Northern Nigeria between 1st of March, and 23rd of July 2024. Study Population: This consists of 114 pregnant women with pre-eclampsia or eclampsia presenting to the unit during the study period.

Sample size: The sample size was calculated using the fisher's formula

$$n = z^2pq/d^2$$

z= standard normal deviation of 1.96 at 95% confidence interval

d= allowable error margin of 5%

q= 1-p

p= prevalence of preeclampsia, which is 7.3% from a study done at UCTH Calabar Nigeria, by James et al.6

Hence, $n=1.96^2 \times 0.073 / (1-0.073) / 0.05^2$, $n= 104$

Adding non-response rate of 10%, the sample size was approximated to 114 participants.

Data collection: Data was collected using a questionnaire containing participants' socio-demographic, anthropometric, obstetric and medical information. The immediate postpartum maternal outcome and perinatal outcome of the participants were also included in the proforma and where necessary, further information was sought from participant's Electronic Health Record (EHR). Exclusion criteria was looked out for either from participant or from participant's EHR. Information regarding preexisting hypertension and the necessity of antihypertensive medications was either obtained from the participant's self-report or from their medical documents. The anthropometric measurements were made with the assistance of trained medical personnel following the standard procedure. The systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured using an automated blood pressure recorder while they were seated in a comfortable position after at least 10 min of rest. The weight was recorded to the nearest 0.1 kg (kg) with the subject standing on the weighing machine without shoes and wearing light clothing.

Information of unstable eclamptic participants was taken after stabilization.

Data Processing and Analysis: Descriptive statistics was used to present the baseline data variables. P-value was obtained from the independent sample t-test for comparison between quantitative variables. Binary logistic regression was applied to determine the relationship between the dependent variables and independent variables. The independent variables that were significant at univariate analysis and some relevant variables were included in the multiple logistic regression models. IBM SPSS, version 25.0 was used for statistical data analysis. The p-value < 0.05 was considered statistically significant.

Important Definition of Terms

Proteinuria (significant): women with a dip-stick protein of 2+ were grouped as having proteinuria.1

Hypertension: hypertension is defined as systolic blood pressure of ≥ 140 mmhg and diastolic blood pressure of ≥ 90 mmhg.19

Preeclampsia: Preeclampsia is defined as having hypertension (≥ 140 mmHg SBP and/or ≥ 90 mmHg DBP) along with either proteinuria or elevated liver enzyme (e.g., ALT level > 40 IU/L) or kidney dysfunction (creatinine > 1 mg/dL). Preeclampsia that developed after 20 weeks of gestation with the previous history of normal blood pressure was noted. Preeclampsia with pre-pregnancy hypertension or that developed before 20 weeks of gestation is defined as preeclampsia superimposed on chronic hypertension.1

Trimesters, gravidity, and parity: women with gestation periods of week 1 to 13 were included as first trimester, 14 to 26 weeks as second trimester, and 27 to 40weeks as third trimester.20 Gravidity was defined as the total number of pregnancies of a woman, regardless of the outcome. Parity was noted as the number of pregnancies reaching ≥ 28 weeks.

Results

During the course of this study, there was a total of 114 participants with Preeclampsia /Eclampsia and a total of 1062 delivery which gives a prevalence of 10.7%. There were 90 patients with Preeclampsia and 24 patients with Eclampsia giving an isolated prevalence of 8.5% and 2.2% Preeclampsia and Eclampsia respectively.

Sociodemographic Characteristics of The Participants

Table 1 is showing the socio-demographic characteristic of the participants. The mean age of the participants was 25.78 ± 8.3 years. While the highest population of the eclamptic women (58.3%) falls below the age of 21 years that of Preeclamptic women (42.2%) falls between 21 and 30 years. However, most of the participants (38.6%) fall below 21 years. Majority of the participants (35.1%) had no formal education and there was no statistically significant relationship in the level of education of the eclamptic and preeclamptic patient. Largest percentage of the participants (38.6%), were Primigravida, most (69.3%) of the patients were also not booked. Majority of these patients (57%) resides in the rural community with most of them (71.1%) having low socioeconomic status. The most common family risk factor was hypertension with 45.3%, which was followed by maternal history of Preeclampsia with 28.1 %, and the lowest was the Diabetes mellitus with 26.6% have history of diabetes.

Variable	Eclampsia N=24	Preeclampsia N=90	PE+E	P-value	Statistical test
Age Group				0.08	$\chi^2=3.11$
≤20	14(58.3%)	30(33.3%)	44(38.6%)		
21-30	4(16.7%)	38(42.2%)	42(36.8%)		
31-40	3(12.5%)	18(20.0%)	21(18.4%)		
40-50	3(12.5%)	3(3.3%)	6(5.3%)		
>50	0(0.0%)	1(1.1%)	1(0.9%)		
Level of Education				0.45	$\chi^2=0.58$
None	11(45.8%)	29(32.2%)	40(35.1%)		
Primary	6(25.0%)	18(20.0%)	24(21.1%)		
Secondary	3(12.5%)	22(24.4%)	25(21.9%)		
Tertiary	4(16.7%)	21(23.3%)	25(21.9%)		
Parity				0.61	$\chi^2=3.50$
0	12(50.0%)	32(35.5%)	44(38.6%)		
1- 4	5(25.8%)	34(37.8%)	39(34.2%)		
>4	7(29.2%)	24(26.7%)	31(27.2%)		
Booking status				0.92	$\chi^2=0.55$
Booked	7(29.2%)	28(31.1%)	35(30.7%)		
Unbooked	17(70.8%)	62(68.9%)	79(69.3%)		
Residential address				0.85	$\chi^2=0.03$
Rural	15(62.5%)	50(55.6%)	65(57.0%)		
Urban	9(35.7%)	40(44.4%)	49(43.0%)		

Socio-economic status	15(62.5%)	66(73.3%)	81(71.1%)	0.63	$X^2=0.08$
Low	9(35.7%)	24(26.7%)	33(28.9%)		
high					
Family medical history	11(39.3%)	47(47.0%)	58(45.3%)	0.06	$X^2=0.37$
Hypertension	7(25.0%)	27(27.0%)	34(26.6%)		
Diabetes	10(35.7%)	26(26.0%)	36(28.1%)		
Preeclampsia					

Table1: Socio-demographic characteristic of the Participants**Participant's Medical History**

Table 2 shows the Participant's common medical risk factors which include chronic hypertension, diabetes mellitus, renal disease, previous preeclampsia and history of COCPs (Combined oral contraceptive pills). About 22.8% of the participants have previous history of preeclampsia, and 27.2% with

history of chronic hypertension. Others were renal disease (17.5%), COCP use (16.7%) and diabetes mellitus with 5.3%. there was statistical significant association between eclampsia and previous history of preeclampsia with a P-value of 0.01. It shows patient with previous preeclampsia are more likely to have eclampsia in subsequent pregnancy.

Variables	Eclampsia N=24	Preeclampsia N=90	PE+E	P-value	Statistical test
History of hypertension					
YES	6(25.0%)	25(27.8%)	31(27.2%)	0.79	$X^2=0.07$
NO	18(75.0%)	65(72.2%)	83(72.8%)		
History of diabetes					
YES	3(12.5%)	3(3.3%)	6(5.3%)	0.07	$X^2=3.19$
NO	21(87.5%)	87(96.7%)	108(94.7%)		
History of preeclampsia					
YES	9(37.5%)	17(18.9%)	26(22.8%)	0.01*	$X^2=8.78$
NO	15(62.5%)	73(81.1%)	88(77.2%)		
History of renal disease					
YES	3(12.5%)	3(3.3%)	6(5.3%)	0.07	$X^2=8.79$
NO	21(87.5%)	87(96.7%)	108(94.7%)		
History of COCPs use					
YES	3(12.5%)	16(17.8%)	19(16.7%)	0.446	$X^2=0.582$
NO	21(87.5%)	74(82.2%)	95(83.3%)		

Table 2: Participants' medical History**Mode Of Delivery**

Table 3 shows the mode of delivery of the participants. Majority of the participants (68.4%) were delivered through caesarean section while only

31.4% had vaginal delivery. There was strong association between caesarean birth and eclampsia with Odd Ratio (OR) of 1.12.

Variables	Eclampsia N=24	Preeclampsia N=90	PE+E	OR	Statistical test
Caesarean Section	20(83.3%)	67(74.4%)	87(76.3%)	1.12	$X=8.79$
Vaginal Delivery	4(16.7%)	23(25.6%)	27(23.7%)		

Table 3: Mode of Delivery**Fetomaternal Outcome**

Abruptio placenta was the most common complication which occurred in 22.2% of the Preeclamptic participants and 33.3% in eclamptic patients with 25(21.9%) average. Followed by pulmonary edema 21(18.4%), aspiration pneumonia 9(7.9%), cerebrovascular accident 4(3.5%), Others 28(24.6%), no complication 27(23.7%).

Table 4 shows that largest proportion of the babies (64.9%), were delivered preterm and 35.1% were term neonates. There is no statistically significant relationship between Preeclampsia/eclampsia and preterm delivery with P-

value of 0.63. There were 20 recorded perinatal deaths among the participants, with their perinatal mortality rate of 17.5%. Eleven (55%) of which were intrauterine fetal death (IUFD) and Nine (45%) were early neonatal death. Those patients with Eclampsia have higher perinatal mortality rate when compared with those with Preeclampsia with an Odd ratio of 2.0 though this was not statistically significant with a P-value of 0.10. The table also shows that most babies (71.1%) after delivery had SCBU admission.

Variables	Eclampsia	Preeclampsia	PE+E	P-value	Statistical test
Gestational age at delivery					
Preterm	17(70.8%)	57(63.3%)	74(64.9%)	0.63	X ² = 40.80
Term	7(29.2%)	33(36.7%)	40(35.1%)		
Neonatal status					
Alive	17(70.8%)	77(85.6%)	94(82.5%)	0.10	X ² = 2.84
Dead	7(29.2%)	13(14.4%)	20(17.5%)		
SCBU Admission					
Admitted	16(66.7%)	68(75.6%)	84(73.7%)	0.38	X ² =27.21
Not admitted	8(33.3%)	22(24.4%)	30(26.3%)		

SCBU= Special Baby Care Unit GA= Gestational Age

END= Early Neonatal Death IUFD= Intrauterine foetal death

Table 4: Fetal outcome

Discussion

The prevalence of preeclampsia/Eclampsia in this study was found to be 10.7%, which was higher than 2.4% previously reported in the same centre[20]. The study found isolated incidence of preeclampsia to be 8.5% and that of eclampsia to be 2.2% which were still higher than 3.02% and 0.58% in a study done by Akaba et-al in North-Central Nigeria[21]. The incidence of 8.5% for Preeclampsia found in this was comparable to 7.4% reported at the UCTH Calabar South- South Nigeria by James et al, [6] but this was lower than 14.4% that was reported by Mou et-al in Bangladesh 1. The mean age of the participants was 25.78±8.3 years while Majority falling below the age of 21years which was closely followed by age between 21-30 years, a finding similar to a multi centred study done by Ola et al [22] and a study done by Yakasai et al [5]. More than half (69.3%) of the parturient did not have antenatal care, this finding was similar to the findings in Lagos south western part of the country [23] but was higher than the report from Owerri South-Eastern part of the country[10] and Kogi State in the North-Central part of the country.[24]

This study shows that patient with previous history of Preeclampsia are more likely to present with eclampsia than preeclampsia. This finding was similar to other reported studies within and outside the country[1-6]but differs from an Iranian study that shows no relationship between previous history of Preeclampsia and current Eclampsia/Eclampsia.[25] The findings of history of previous Preeclampsia association with Eclampsia in our study may be due to low level of formal education, lack of antenatal care and low socioeconomic status among our patients. Risk factors such as age, parity, residential address, patient and family history of medical disorders were found to be associated with preeclampsia/Eclampsia and this was similar to the previous finding in the same hospital.[20] The finding that most patients with preeclampsia/eclampsia were from the rural community was in contrast to the reports by Amariqua-Obi and colleagues and Njelita and colleagues that found higher risk of preeclampsia in urban dwellers.[10,11]

The caesarean section rate of 68.4% in this study was higher than previous reported findings within the Country. [26,27] This could be due to the high level of preterm delivery found in majority (64.9%) of the participants alongside with the need to preventing poor neonatal outcome experienced with vaginal delivery among premature neonates in our centre, hence promoting caesarean delivery. Patient with Eclampsia also have higher odd of having caesarean birth when compared with those with Preeclampsia in this study. This was different from report by Irene Et-al that showed that vaginal delivery was more favourably supported in this group of Patients. [28]

Abruption placenta top the maternal complication for Preeclampsia and eclampsia, and the Finding was similar to the reported findings within and outside the country[29,30]. Larger proportions (64.9%) of the babies were

delivered preterm, which were also similar to other reported findings in previous studies[29,30]. There was high rate of SCBU admission (71.1%) in this study and may be related to of high preterm birth among the participants. The finding of high need for SCBU care seen in this study was higher than reported by some studies. [29,31,32] There was high perinatal mortality rate in our study which was similar to the other findings in Nigeria.[18,23,29] though other studies reported lower perinatal mortality rate. [1, 28]. This Study shows that there was high perinatal morbidity and mortality associated with preeclampsia/eclampsia irrespective of the mode of delivery.

Conclusion:

This study found the prevalence of preeclampsia/eclampsia to be relatively high, high risk of recurrent preeclampsia/eclampsia in participants with previous history of preeclampsia. There was also high rate Caesarean section among preeclamptic/eclamptic patients especially before term (37 completed weeks) with high perinatal morbidity and mortality.

Recommendations:

It is essential to continue exploring risk factors and outcomes among women with preeclampsia in order to identify any remaining barriers to optimal maternal and perinatal care.

There is need better surveillance for women with previous history of preeclampsia, who generally face higher risks for Eclampsia and other hypertensive disorders in subsequent pregnancies.

Prenatal Corticosteroid administration, close foetal and neonatal monitoring and timely intervention are crucial in preventing adverse outcomes.

Limitations:

This is a hospital base study which cannot be generalized. Also, being a cross-sectional may be prone to bias. The limited population of the patients may be a major factor in the strength of this study.

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