



Prevalence, Seasonal Variation and Feto-Maternal Outcomes of Severe Pre-Eclampsia/ Eclampsia at a Tertiary Hospital in North Central Nigeria

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ARTICLE INFO

Article History

Received: April 23, 2024

Accepted: July 20, 2024

Published: August 10, 2024

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Technical Information

How to Cite: Ojurongbe A.O. et al. Prevalence, Seasonal variation and Feto-Maternal outcomes of Severe Pre-Eclampsia/ Eclampsia at a Tertiary Hospital in North central Nigeria: SLJM 2024;Vol 1(2) pp 70-74.

<https://doi.org/10.69524/sljm.v1i2.49>

Editor-in-Chief: Prof. Kehinde S. Oluwadiya, University of Sierra Leone Teaching Hospitals Complex, Freetown, Sierra Leone.

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Funding: No funding was received for this study.

Ethical Consideration

Conflict of interest: The authors declare they have no conflicts of interest that are directly or indirectly related to the research.

ABSTRACT

Background: Severe pre-eclampsia-eclampsia is a type of hypertensive disorders in pregnancy associated with increased maternal and perinatal morbidity and mortality.

Methods: This was a retrospective study. The records of women admitted and managed with severe pre-eclampsia-eclampsia at the Federal Medical Centre Keffi from 1st January 2020 to 31st December 2022 were retrieved from the health information management unit, labour ward, post natal ward and theatre of the hospital. Relevant data such as; patients' age, parity, education, booking status, gestational age at delivery, diagnosis, complications, mode of delivery, birth weight, Apgar scores, month of presentation and final outcome (alive or dead) were imputed into a proforma. The data were collated and analyzed using IBM SPSS 25. Descriptive and inferential statistics were computed for all data and results presented in simple tables and charts.

Results: There were 4,050 deliveries conducted of which 123 women had severe pre-eclampsia/eclampsia, resulting in a prevalence of 3.8%. Of these, 80 (65%) had severe pre-eclampsia and 43 (35%) had eclampsia. The mean age of the women was 29.88 ± 6.71 years and mean gestational age was 36 ± 3.483 weeks. There were 7 maternal deaths, giving a case fatality rate of 5.7%. The mean birth weight \pm SD was 2.46 ± 0.860 kg and stillborn rate was 26.8%. Severe pre-eclampsia/eclampsia was more common during the wet season.

Conclusions: The prevalence of pre-eclampsia/eclampsia was high in this study, with associated increased maternal and perinatal morbidity and mortality. Urgent interventions are required to address this significant health concern

Key words: Pre-eclampsia, Eclampsia, Risk factors, Pregnancy, Neonatal, Mortality, Morbidity, Nigeria.

1. INTRODUCTION

Hypertensive disorders in pregnancy especially pre-eclampsia/eclampsia is said to complicate about 2-8% of pregnancies and it's a major contributor to maternal and neonatal morbidity and mortality worldwide.^{1,2} In Nigeria, hypertensive disorders in pregnancy (HDP) accounts for 15-30% of maternal deaths as it ranks amongst the first three major causes of maternal mortality.^{1,3,4} Hypertension is defined as a blood pressure measurement of $\geq 140/90$ mmHg or more recorded at least on two occasions at least 4 hours apart. Proteinuria is significant if the protein in a 24-hour urine is at least 300mg or above 1 gm/L on dipstick testing (equivalent of 1+ or more on a urinary strip) in at least two random urine specimens collected 4 or more hours apart, without evidence of urinary tract infection is considered significant proteinuria for the diagnosis of severe preeclampsia.^{1,3}

Hypertensive disorder of pregnancy (HDP) is a broad class comprising of pre-eclampsia, eclampsia, gestational hypertension, chronic hypertension with or without superimposed pre-eclampsia and unclassified hypertension and or proteinuria.^{1,5-7} Pre-eclampsia is a multisystem disease characterized by sudden onset of elevated blood pressure accompanied with or without edema, occurring after 20 weeks of gestation in a known normotensive, non-proteinuric woman. This is also called

gestational proteinuric hypertension by International Society for the Study of Hypertension in Pregnancy (ISSHP).²⁻⁶ Pre-eclampsia is considered severe or in recent time called “Pre-eclampsia with severe features” when BP is $\geq 160/100$ mmHg and proteinuria is ≥ 5 gm in 24 hours urine sample or $\geq 2+$ in a dipstick sample. This classification is further supported when symptoms of end organ damage like altered liver function, renal insufficiency (creatinine >1.1 mg/L), pulmonary oedema, thrombocytopenia (count $< 100 \times 10^9/L$) and fetal growth restriction are present.^{3,6,8,9} Eclampsia, on the other hand, is the occurrence of convulsion in a pre-eclamptic patient in the absence of coincidental neurological disease.^{3,10}

Pre-eclampsia- eclampsia remains a major obstetric challenge despite significant investment in unraveling its pathophysiology, thus it is still called “the disease of many theories”.¹ Pre-eclampsia is primarily a disorder of nulliparous, although it can also occur in multiparous women with new husbands.¹¹ Globally, pre-eclampsia is estimated to complicate about 2–8 % of all pregnancies.¹ The incidence is estimated to be seven times higher in

developing countries (2.8% of live births) compared to developed countries where it constitutes 0.4% of live births.^{2,3,10,12} Some Nigerian studies have reported an incidence of between 2–16%, however a lower incidence of 1.75% had been reported in Abakaliki by Ajah et al.^{3,8} Other studies have reported a higher incidence among primigravidae and young women less than 25 years of age.⁹ Pre-eclampsia-eclampsia has also been reported as one of the leading causes of maternal mortality in Kano, Sokoto, Jos and Port Harcourt.¹² Worldwide, it is estimated that about 4 million women are diagnosed with pre-eclampsia ^{1,2} each year, causing the deaths of $>70,000$ women and 500,000 babies.¹⁰ The World Health Organization’s recommendation for prevention and treatment of pre-eclampsia/eclampsia identified some key risk factors such as previous pre-eclampsia, renal disease, chronic hypertension, diabetes, nulliparity, obesity (BMI ≥ 35 kg/m²), adolescent pregnancy, advanced maternal age ≥ 40 year, conditions leading to hyperplacentation / large placentas (e.g. twin pregnancy) and autoimmune diseases.¹³⁻¹⁵

Significant advances have been made in the prediction and prevention of preterm pre-eclampsia. This is done in early pregnancy through combined screening and is prevented with daily low-dose aspirin, starting before 16 weeks of gestation.

The ultimate treatment for preeclampsia-eclampsia and prevention of maternal complications is to effect delivery of the patient, which in most cases is not in the best interest of the fetus. In some cases delivery may be delayed to allow for more fetal maturity and reduce perinatal morbidity and mortality, which includes iatrogenic prematurity, respiratory distress syndrome (RDS), intrauterine growth restriction (IUGR), intrauterine asphyxia and intrauterine fetal death (IUFD).^{1,2} Maternal complications include cerebrovascular accidents (CVA), acute renal failure (ARF), haemolysis, elevated liver enzymes and low platelets (HELLP) syndrome and abruptio placentae.^{2,5}

Some of the contributing factors to the vulnerability of pregnant women to the major complications of pre-eclampsia-eclampsia includes but not limited to poor levels of education, low socio-economic status, poor health care systems, lack of trained staff, poor referral system and patriarchal culture.^{8,11}

In view of the high maternal and fetal complications associated with severe pre-eclampsia/eclampsia, which makes it an issue of public health concern,¹¹ This study sought to evaluate the incidence of severe pre-eclampsia-eclampsia, associated risk factors, possible seasonal variations and fetomaternal outcomes at the FMC, Keffi, North Central Nigeria.

2. METHODOLOGY

2.1 Study Area

The study was conducted at the Department of Obstetrics and Gynaecology, Federal Medical Center, Keffi, North Central, Nigeria. The centre is a referral hospital serving Nasarawa State and other neighboring states like Kaduna, Kogi and the Federal Capital Territory Abuja. The research study was conducted from 1st January 2020 to 31st December 2022. The centre has an average of 1200 deliveries per annum.

2.2 Study Population and Design

This study was a retrospective study involving all cases of severe pre-eclampsia-eclampsia managed at the hospital between 1st January 2020 to 31st December 2022. Those with incomplete data, history of previous renal diseases or seizure disorders were

Table 1: Socio-Demographic and Obstetric Characteristics

		Frequency	Percentage
Age	<20	9	7.3
	20-29	46	37.4
	30-39	62	50.4
	>40	6	4.9
Occupation	Unemployed	53	43.1
	Civil servant	21	17.1
	Trader	20	16.3
	Farmer	14	11.4
	Artisan	10	8.1
	Other	5	4.1
Marital status	Married	119	96.7
	Single	4	3.3
Religion	Christianity	66	53.7
	Islam	57	46.3
Tribe	Hausa/ Fulani	51	41.5
	Igbo	27	21.9
	Others	25	20.3
	Yoruba	20	16.3
Level of Education	No formal education	44	35.8
	Secondary	28	22.8
	Primary	26	21.1
	Tertiary	25	20.3
Parity	0	20	16.3
	1	35	28.5
	2-4	51	41.4
	5 and above	17	13.8
Gestational Age	<36 weeks	38	30.9
	36-40 weeks	79	64.2
	≥ 40	6	4.9
Mode of Delivery	Caesarean Section	85	69.1
	SVD	38	30.9
Booking Status	Booked	63	51.2
	Unbooked	60	48.8

Table 2: Associated Maternal Risk Factors

Risk Factor	Total n (%)	Total n (%)
None	48	39.0
Nulliparity	20	16.3
Family History	18	14.6
Hypertension	18	14.6
Advanced Maternal Age	8	6.5
Diabetes Mellitus	4	3.3
Change of Husband	4	3.3
Multiple Gestation	3	2.4

excluded from the study. During the study period 154 women were managed for severe pre-eclampsia-eclampsia.

2.3 Data Collection

Information of all the patients who delivered in our facility during the period under review was retrieved from the health information management unit, obstetric registers in the labor ward, postnatal ward and the operating theatre. Using a proforma that included information on sociodemographic characteristics, booking status, gestational age at delivery, identifiable risk factors, months of presentation, and complications were extracted. Additionally, diagnosis, blood pressures, and urinalysis results on admission, neonatal APGAR scores, birth weights, and neonatal complications were also documented.

2.4 Data Analysis

Data were sorted and analyzed using IBMS PSS 25. The descriptive analysis of the patients' sociodemographic characteristics was presented in tables as frequency, proportions, and means. Severe disease was defined as a case with systolic BP of ≥ 160 mmHg and diastolic BP of ≥ 110 mmHg. The relationship between severe disease and sociodemographic was evaluated using Chi-squared test at 5% level of significance

2.5 Ethical Approval

The ethical approval for the conduct of this research was obtained from the ethical committee of Federal Medical Centre Keffi with a reference number FMC/KF/HREC/02646/24.

2.6 Data Availability

The raw data for this study were generated at the Federal medical Centre, Keffi. Derived data supporting the findings of this study are available from the corresponding author Fijabiyi Matthew (ORCID ID- 0000-0001-6213-0538) on request.

3. RESULT

During the period under review, a total of 4,050 deliveries were conducted of which 154 women were managed for severe pre-eclampsia-eclampsia, yielding a prevalence rate of 3.8%. Complete record was gotten for only 123 women, which was analyzed. Of these, 80 (65%) had severe preeclampsia (prevalence of 1.98% relative to total deliveries), while 43 (35%) presented with eclampsia (prevalence of 1.06% relative to total deliveries).

The mean age of the women was 29.88 ± 6.71 years. The modal age group was 30–39 years comprising 62 (50.4%) women. Of the 123 women, 53 (43.1%) were unemployed, 119(96.7%) were married, 66(53.7%) were Christians and 51(41.5%) belong to the Hausa/Fulani extraction. Most of the women had no formal education 44(35.8%), the rest (64.2%) had formal levels of education at various levels. The mean gestational age was 36 ± 3.483 weeks with a range of 26–42weeks. Majority of the women (69.1%) were delivered with caesarean section [Table 1]. Among the risk factors, primigravida 20 (14.6%), previous history of hypertension 18

Table 3: Neonatal Outcomes

	Number	(%)
Birth Weight		
<2.5	61	49.6
≥ 2.5	62	50.4
Apgar Score At 1st Min		
<7	67	54.5
≥ 7	56	45.5
Apgar Score At 5 Mins		
<7	48	39.0
≥ 7	75	61.0
NICU Admission		
Yes	46	37.4
No	77	62.6
Outcome		
Alive	90	73.2
Dead	33	26.8
*Fetal Indication NICU Admission		
No Indication	76	61.8
Birth Asphyxia	21	17.1
Prematurity	10	8.1
Asphyxia	6	4.9
Risk of Sepsis	2	1.6
LBW	2	1.6
Macrosomia	1	0.8
Risk of Sepsis + Macrosomia	1	0.8
Prematurity + LBW	1	0.8
Birth Asphyxia + LBW	1	0.8
Prematurity + LBW		
Risk of hypo-glycaemia	1	0.8
IUGR	1	0.8

NICU: Neonatal Intensive Care Unit;
LBW: Low Birth Weight;
IUGR: Intrauterine growth Retardation

(14.6%), and family history of hypertension 18 (9.1%) were the commonest [Table2]. The mean birth weight of the neonate was 2.46 ± 0.860 kg with a range of 1.0–4.6kg. A good proportion of the neonates, 62(50.4%) had birth weights ≥ 2500 gm, 75(61.0%) had a good Apgar score (≥ 7) at 5 minutes, while 46 (37.4%) required admission to special baby care unit (SCBU) and 33(26.8%) had fatal outcomes (Table 3). Acute kidney injury was the commonest maternal complication, while a low APGAR score at 5 min was the most common fetal complication [Tables 4 and 5]. As table 6 shows, the prevalence of severe pre-eclampsia-eclampsia was higher during the wet season ($P=0.01$). The case fatality rate in this study was 5.7%

4. DISCUSSION

Preeclampsia-eclampsia still remain a major public health threat with the greatest burden borne by developing countries.¹¹ A recent multicenter study report identified preeclampsia-eclampsia as the leading cause of maternal mortality and a major cause of fetal wastage in Nigeria, overtaking obstetric hemorrhages and sepsis.¹⁶ The combined prevalence in this study was 3.8% with severe preeclampsia responsible for 80% (1.98%) and eclampsia 43% (1.06%). The combined prevalence of severe preeclampsia/ eclampsia 3.8% in this study was lower than 4.0% reported by Onoh et al but higher than 2.85% and 3.6% reported by Awoyesuku and Akaba et al. The prevalence of severe pre-eclampsia 1.98% in this study was lower than 2.09%, 3.02% and 4.2% reported by Onoh et

Table 4: Associated Maternal Complications

Parameter	Frequency (No.)	Percentage (%)
No Complications	78	63.40%
AKI	13	10.60%
PPH	12	9.80%
CVA	8	6.50%
HELLP	4	3.30%
Abruptio Placenta	3	2.40%
DIC	3	2.40%
Pulmonary Edema	1	0.80%
Eclampsia	1	0.80%

al, Akaba and in Ethiopia respectively. The prevalence of eclampsia in this study was 1.06% which was higher than values of 0.58%, 0.6% and 0.76% reported by Akaba, Onoh et al and Ajah et al respectively, However this value was lower than the 1.66 and 4.4% reported in Lagos and Sokoto respectively.^{3,9,17-20,23}

This study revealed that 63 (51.2%) of all the cases managed were booked patients. This is contrary to studies which had reported a higher prevalence in unbooked women. The majority of eclamptic cases were unbooked women.^{19,21,22} Nulliparity is the leading maternal risk identified in this study and this had been reported by many other researchers.^{8,19,22}

The high risk of preterm delivery among patients with severe preeclampsia/eclampsia, has been attributed to the recommended interventional care and early delivery usually given to these patients after stabilization, but most of the babies delivered in this study were delivered at term. The high rate of caesarean delivery in this study was similar to those of previous studies and the explanation is due to the emergency delivery approach usually adopted especially in presence of an unfavourable cervix, to avert further maternal and perinatal complications. This finding was similar to that reported by Awoyesuku et al.^{8,9}, This study revealed that severe pre-eclampsia/eclampsia was common during the wet seasons than the dry season, this was similar to the findings of Okafor, and Mutabazi et al,^{24,25} but this disagree with the findings of Ikeanyi in Bayelsa where the incidence was noted to be higher during the dry season.²⁶ However the association between seasonal variation and occurrence of severe pre-eclampsia/eclampsia was significant with $P=0.01$. Some researchers attribute the high incidence of preeclampsia/eclampsia during the wet season to increasing humidity, lower temperature, seasonal variation in infectious diseases, malaria, and nutritional intake. Another important factor is poor access to health care facilities during the raining season, which caused patients to present late in worsened clinical condition.^{27,27} Further study in this regard is recommended, as they may help in unraveling the pathophysiology of this condition.

The maternal case fatality rate of 5.7% in this study was higher than the 3.9% reported in Abuja, but lower than the reports of 15.6% in Benin, 9% in Ibadan and 12.1% in Abakaliki.^{9,22,26} The reason for these variations may be due to differences in the health-seeking behavior among pregnant women and referral system patterns in the different geopolitical zones considered.

4.1 Conclusion

Table 6: Association Between Seasonal Variation And Diagnosis

Variable	Dry season (%)	Wet season (%)
Severe preeclampsia /	47 (38.2)	76 (61.8)
No hypertension	2023 (51.5)	1904 (48.5)

Chi-square = 7.92; $p=0.01$

Table 5: Fetal/ Neonatal Complications

Parameter	Frequency	Percentage
No Complications	64	52.0%
Birth Asphyxia	24	19.5%
IUFD	22	17.9%
IUGR	5	4.1%
Prematurity	5	4.1%
Asphyxia/ prematurity	1	0.8%
Fresh Still Birth	1	0.8%
Perinatal Asphyxia	1	0.8%

The prevalence of severe preeclampsia-eclampsia in this study was high, with attendant high maternal and perinatal mortality rates. The majority of the women managed had no formal education, were unemployed, and were referred from other facilities in worsened conditions, as this is the only federal health care institution in the state. Improving the quality of care, especially at primary health centers and other referral centers, as well as advocating for prompt referral of cases, should be prioritized.

4.2. Limitation

A major limitation of this study was the difficulty experienced with retrieving patient electronic medical records. The records were either missing or incomplete.

Conflicts of Interest

The authors declare no conflicts of interest

Funding

No funding was received for this study.

Contributor Roles Taxonomy Statement

Ojorongbe, A.O.: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Resource, Visualization, Supervision, Writing-Original draft, Writing – review and editing.

Fijabiyi, M. O.: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Resource, Visualization, Writing-Original draft, Writing – review and editing.

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Tunde-Olatunji, O.A: Formal Analysis, Funding acquisition, Investigation, Methodology, Project Administration, Supervision, Writing – review and editing.

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