International Journal of Research in Medical Sciences
Oriji PC et al. Int J Res Med Sci. 2021 Oct;9(10):2923-2929
www.msjonline.org
pISSN2320-6071 | eISSN2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20213914

Original Research Article

Hypertensive disorders in pregnancy at the Federal Medical Centre, Yenagoa, South-South Nigeria: a 5-year review

Peter Chibuzor Oriji[1], Dennis Oju Allagoa[1]*, Akaninyene Eseme Ubom[2], Amos Kattey Kattey[3], Datonye Christopher Briggs[4], Maduabuchi Nduaguba Chika[1], Ugoeze Nneka Iloeje[5], Inere Daniel Akanatei[6], Gordon Atemie[1]

[1]Department of Obstetrics and Gynaecology, Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria
[2]Department of Obstetrics, Gynaecology and Perinatology, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun State, Nigeria
[3]Department of Community Medicine and Public Health, Rivers State University Teaching Hospital, Port Harcourt, Rivers State, Nigeria
[4]Department of Paediatrics, Rivers State University Teaching Hospital, Port Harcourt, Rivers State, Nigeria
[5]Department of Medicine (division of cardiology), Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria
[6]Department of Obstetrics and Gynaecology, Niger Delta University Teaching Hospital, Okolobiri, Bayelsa State, Nigeria

Received: 24 August 2021
Revised: 16 September 2021
Accepted: 20 September 2021

***Correspondence:**
Dr. Dennis Oju Allagoa,
E-mail: dennisallagoa@yahoo.com

ABSTRACT

Background: Hypertensive disorders complicate 5.2%-8.2% of pregnancies, and contribute significantly to perinatal and maternal morbidity and mortality worldwide. The objective of this study is to determine the incidence, clinical characteristics, maternal and perinatal outcomes of hypertensive disorders in pregnancy at the Federal Medical Centre, Yenagoa, Bayelsa State, South-South Nigeria.
Methods: This retrospective study was conducted between 1 January, 2016 and 31 December, 2020. Relevant data was retrieved, entered into a pre-designed proforma, and analysed using IBM SPSS version 25.0.
Results: Out of the 4,571 obstetric patients that were managed in our Centre in the period under review, 335 of them had HDP, giving an incidence rate of 7.32%. The most common HDP were pre-eclampsia (189, 56.4%) and eclampsia (82, 24.5%), while the least common was chronic hypertension (3, 0.9%). A little more than one-half (171, 51.0%) of the women delivered preterm, with a mean gestational age at delivery of 35.5 weeks. The most common route of delivery was emergency Caesarean section (205, 61.2%). There were three maternal deaths, giving a case fatality rate of 0.9%. Two of the maternal deaths were due to eclampsia, and one, from pre-eclampsia.
Conclusions: Women should be adequately counseled to embrace preconception care, early booking and regular antenatal care visits, with proper monitoring of blood pressure and urine protein. Prompt diagnosis and management are key in preventing the maternal and perinatal morbidity and mortality that are associated with these disorders.

Keywords: Hypertensive disorders, Eclampsia, Pre-eclampsia, Outcomes, Morbidity, Mortality

INTRODUCTION

Hypertensive disorders complicate 5.2%-8.2% of pregnancies and are responsible for about 12% of maternal deaths worldwide.[1,2] In sub-Saharan Africa, they account for more than 50% of maternal deaths.[3] Hypertensive disorders in pregnancy are broadly classified into gestational hypertension, chronic

hypertension, chronic hypertension with superimposed pre-eclampsia, pre-eclampsia and eclampsia. Gestational hypertension and pre-eclampsia complicate 1.8%-4.4% and 0.2%-9.2% of pregnancies respectively.[1] The prevalence of eclampsia was reported by Itam and Ekabua as 0.3% in a tertiary hospital in South-South Nigeria.[4] Pre-eclampsia and eclampsia are very important in this classification, because they are associated with significant maternal and perinatal morbidity and mortality.[5,6] Pre-eclampsia is a multisystemic disorder characterized by first onset hypertension and proteinuria in the second half of pregnancy, in a previously normotensive and non-proteinuric woman. The condition usually resolves after delivery.[7] Eclampsia is a complication of pre-eclampsia. It is the presence of fits or unconsciousness in a woman with pre-eclampsia. An entity called atypical eclampsia has been described. This is a condition where eclampsia occurs without previous symptoms and signs of preeclampsia. Pre-eclampsia/ eclampsia can occur antepartum, intrapartum or post-partum.

The aetiology of pre-eclampsia is unknown. However, there are proposed theories. One of these theories is defective invasion of the maternal spiral arteries by trophoblastic tissue during placental formation. Placental ischemia arises due to an imbalance between pro-angiogenic and anti-angiogenic factors. This placental ischemia is associated with oxidative stress and maternal inflammatory response. Widespread endothelial damage which arises from this cascade of events may explain the multisystemic nature of the disease. The recent discoveries of the soluble fms-like tyrosine kinase substance and soluble endoglin have shed more light on the theories surrounding the origin of the condition.[8-10] The risk factors for pre-eclampsia may be high-risk or moderate-risk factors. High-risk factors include hypertensive disorder during a previous pregnancy, chronic kidney disease, autoimmune disease such as systemic lupus erythematosus or antiphospholipid syndrome, type 1 or type 2 diabetes, or chronic hypertension. Moderate-risk factors include first pregnancy, age 40 years or older, pregnancy interval of more than 10 years, body mass index of 35 kg/m^2 or more at first visit, multiple pregnancy and family history of pre-eclampsia.[11] Other risk factors for pre-eclampsia include black race, assisted reproductive technology, new male partner, spouse being product of a pregnancy complicated by pre-eclampsia.[12,13] Pre-eclampsia may be classified as mild or severe, depending on the clinical presentation, and the laboratory findings. When the blood pressure is <160/110 mmHg without clinical features, it is considered as mild pre-eclampsia. If the blood pressure is ≥160/110 mmHg or the patient has clinical features, irrespective of the degree of hypertension and proteinuria, the condition is considered as severe pre-eclampsia. The clinical features could be any of these: headaches, visual disturbances, vomiting, pulmonary oedema, epigastric pain, oliguria, foetal growth restriction, deranged renal function tests, liver function tests, clotting profile or oligohydramnios.[14]

The principles of management are prevention/control of fits, control of blood pressure and to expedite delivery by the faster and safer route, while investigating, to exclude and treat possible complications. Magnesium sulphate ($MgSO_4$) is the drug of choice for the prevention of eclampsia and control of eclamptic fits.[14] The Pritchard and Zuspan regimen are the more commonly used regimens for administration of $MgSO_4$. The mechanism for the anticonvulsant effects of $MgSO_4$ has not been clearly defined. The primary effect is thought to be central. The part of the brain that $MgSO_4$ exerts its effect is in the hippocampus, which is located in the inner medial region of the temporal lobe. Hypotheses include raising the seizure threshold by its action at the n-methyl d-aspartate (NMDA) receptor, membrane stabilization in the central nervous system secondary to its action as a non-specific calcium channel blocker, as well as decreasing acetylcholine transmission in motor nerve terminals.[14] Another theory is that it promotes vasodilatation of constricted cerebral vessels by opposing calcium-dependent arterial vasospasm, thereby reducing cerebral barotrauma.[14] Side effects of $MgSO_4$ include diaphoresis, flushing, and warmth, probably related to peripheral vasodilation and a reduction in blood pressure.[14] Nausea, vomiting, headache, muscle weakness, visual disturbances, and palpitations can also occur.[15,16] Dyspnoea or chest pain may be symptoms of pulmonary oedema.[14] Toxicity of $MgSO_4$ includes loss of deep tendon reflexes, respiratory depression, cardiac arrest and coma. Magnesium sulphate has a narrow therapeutic index and its toxicity can be monitored by ensuring that the urinary output is at least 25 ml/hour, respiratory rate is at least 12 cycles per minute and deep tendon reflexes are intact.[14] Serum magnesium levels could be checked regularly to prevent toxicity, where laboratory services are available. Intravenous calcium gluconate at a dose of 1g of 10% solution, given over 10 minutes, is an effective antidote for magnesium sulphate toxicity.[14] Severe hypertension in labour should be treated with intravenous hydralazine, labetalol or oral nifedipine to prevent cerebrovascular accident from intracranial haemorrhage.[14] Alpha methyl dopa has been associated with post-partum depression, hence its administration in the post-partum period is not encouraged. Once the diagnosis of severe pre-eclampsia is made, delivery is mandatory within 6-8 hours after stabilising the patient. If vaginal delivery is opted for, delivery should be expedited with augmentation of labour and shortening of the second stage of labour, usually with a pair of obstetric forceps. If the cervix is unfavourable, there is foetal compromise or vaginal delivery is not feasible within 6-8 hours, emergency Caesarean section should be done preferably.[15,16] If mild pre-eclampsia occurs remote from term, when foetal lung maturity is yet to be achieved, conservative management until foetal lung maturity is achieved, is recommended.[14] When severe pre-eclampsia occurs remote from term, some

clinicians advocate immediate delivery.[15,16] Complications of pre-eclampsia include maternal and foetal. Some of the maternal complications include placental abruption, eclampsia, HELLP syndrome (Haemolysis, Elevated Liver enzymes, Low Platelet count), disseminated intravascular coagulation (DIC), acute kidney injury (AKI), cerebrovascular haemorrhage, cortical blindness, and adult respiratory distress syndrome. The foetal complications include intrauterine growth restriction (IUGR), preterm delivery and intrauterine foetal death (IUFD). The role of prevention in HDP cannot be overemphasized. Studies have shown that the use of daily low dose aspirin after 12 weeks of gestation and calcium supplementation in environments with low calcium intake help reduce the risk of pre-eclampsia.[7] Predictive factors for preeclampsia have been shown to play helpful roles in the prevention, early institution of management, and prognosis of this disorder.[17-19] The objective of this study was to determine the incidence, clinical characteristics, maternal and perinatal outcomes of HDP at the Federal medical centre, Yenagoa, Bayelsa State, South-South Nigeria.

METHODS

This retrospective study was conducted in the obstetric unit of the Federal Medical Centre, Yenagoa, Bayelsa State, South-South, Nigeria, between 1 January 2016 and 31 December 2020. Federal Medical Centre, Yenagoa, is one of the two tertiary health institutions located in Bayelsa State, and its core mandate revolves around service, training and research, and serves as a referral centre for hospitals in Bayelsa State and neighbouring Delta and Rivers States. All the women managed for HDP in our facility during the period under review were included in this study. All other patients without HDP were excluded from the study. Relevant data were retrieved from the case records of the women using a purpose-designed proforma. These data included sociodemographic characteristics, clinical characteristics and management, maternal and perinatal outcomes. Data extracted was analyzed using IBM SPSS version 25.0. Results were presented in frequencies and percentages for categorical variables, and mean and standard deviation, for continuous variables.

RESULTS

Sociodemographic characteristics of parturients

Out of the 4,571 obstetric patients that were managed in our centre in the period under review, 335 of them had HDP, giving an incidence rate of 7.32%. The mean age of the women was 30.2 years. Most of the women were married (256, 76.4%), traders (140, 41.8%), and unbooked (275, 82.1%). Only 41, (12.2%) of the women had tertiary level of education. These sociodemographic characteristics are shown in Table 1.

Table 1: Sociodemographic characteristics of women with hypertensive disorders of pregnancy.

Characteristics (n=335)	N	%
Age (years)		
<20	18	5.4
20-29	127	37.9
30-39	174	51.9
≥40	16	4.8
Marital status		
Married	256	76.4
Single	77	23.0
Separated	2	0.6
Level of education		
No formal education	6	1.8
Primary	90	26.9
Secondary	198	59.1
Tertiary	41	12.2
Occupation		
Trader	140	41.8
Unemployed	95	28.4
Farmer	41	12.2
Civil servant	30	9.0
Professional	15	4.5
Artisan	14	4.2
Booking status		
Unbooked	275	82.1
Booked	60	17.9
Total	335	100

Clinical classification of hypertensive disorders in pregnancy

The most common HDP were preeclampsia (189, 56.4%) and eclampsia (82, 24.5%), while the least common was chronic hypertension (3, 0.9%) (Table 1). Almost two-third of eclamptic fits (51/82, 62.2%) occurred antepartum and intrapartum (Figure 1). The most frequent risk factors for hypertensive disorders in pregnancy included a family history of hypertensive disorders in pregnancy (263, 78.5%), maternal age ≥40 years (92, 27.5%), and new male partner (74, 22.1%) (Table 1). The mean duration of hospital stay was 7.82 days. A little more than one-half (171, 51.0%) of the women delivered preterm, with a mean gestational age at delivery of 35.5 weeks (Table 1). The most common route of delivery was emergency Caesarean section (205, 61.2%), as shown in Table 2.

Maternal and perinatal outcomes of hypertensive disorders of pregnancy

There were three maternal deaths, giving a case fatality rate of 0.9%. Two of the maternal deaths were due to eclampsia, and one, from pre-eclampsia. Abruptio placentae (14, 4.2%), pulmonary oedema (13, 3.9%) and HELLP syndrome (12, 3.6%), were the most frequent

maternal complications, whereas admission into the NICU (159, 47.5%) and prematurity (147, 43.9%) were the commonest perinatal complications.

Table 2: Clinical characteristics of women with hypertensive disorders of pregnancy.

Characteristics (n=335)	Frequency	(%)
Diagnosis		
Preeclampsia	189	56.4
Eclampsia	82	24.5
Gestational hypertension	51	15.2
Chronic hypertension with superimposed preeclampsia	10	3.0
Chronic hypertension	3	0.9
Risk factors*		
Family history of hypertensive disorder of pregnancy	263	78.5
Maternal age ≥40 years	92	27.5
New male partner	74	22.1
Nulliparity	67	20.0
Previous preeclampsia	20	6.0
Multiple gestation	7	2.1
Diabetes mellitus	4	1.2
Chronic kidney disease	1	0.3
Molar pregnancy	1	0.3
Pregnancy order		
Singleton	327	97.6
Twins	8	2.4
Duration of hospital stay (days)		
<10	265	79.1
10-19	62	18.5
≥20	8	2.4
Gestational age at delivery (weeks)		
<37	171	51.0
≥37	164	49.0
Mode of delivery		
Vaginal delivery (N=126)		
Spontaneous	125	99.2
Assisted vaginal breech	1	0.8
Caesarean section (N=209)		
Emergency	205	98.1
Elective	4	1.9

*Multiple risk factors in some patients, hence total >335

There were 327 singleton and eight twin deliveries (total babies delivered = 343), with 31 perinatal deaths, giving a perinatal mortality rate (PMR) of 9.0% (90 per 1,000 births). These outcomes are depicted in Table 3.

Drug treatment of hypertensive disorders of pregnancy

Ninety percent (301) of the women received magnesium sulphate, either for seizure prophylaxis in preeclampsia, or to abort further seizures in eclampsia (Table 4). Pritchard was the regimen used in all cases. Hydralazine was the most commonly used antihypertensive agent (321, 95.8%).

Table 3: Maternal and perinatal outcomes of hypertensive disorders of pregnancy.

Characteristics (n=335)	N	%
Maternal outcome		
Alive	332	99.1
Dead	3	0.9
Maternal complications*		
Nil	288	86.0
Abruptio placentae	14	4.2
Pulmonary oedema	13	3.9
HELLP syndrome	12	3.6
Disseminated intravascular coagulopathy	7	2.1
Acute kidney injury	5	1.5
Cerebrovascular accident	2	0.6
Perinatal complications (n=343)*		
Nil	148	43.1
NICU admission	159	46.4
Preterm birth	147	42.9
Birth asphyxia		
Mild	12	3.5
Moderate	16	4.7
Severe	7	2.0
Perinatal death	31	9.0
IUGR	2	0.6

*Multiple complications in some women and babies, hence total >335 and 343 respectively; IUGR (intrauterine growth restricted); NICU (neonatal intensive care unit).

Table 4: Drug treatment of hypertensive disorders of pregnancy.

Drug (n=335)	N	%
Magnesium sulphate	301	89.9
Hydralazine	321	95.8
Labetalol	17	5.1
Alpha methyldopa	15	4.5
Nifedipine	8	2.4

*Multiple drugs used in multiple women, hence total >335.

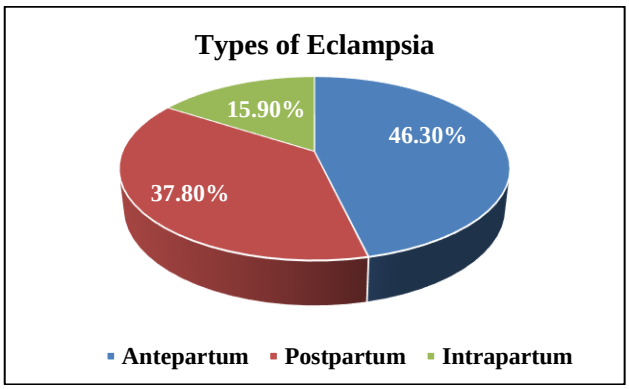

Figure 1: Types of eclampsia.

DISCUSSION

In our study, the incidence of HDP was 7.32%. This is within the reported range of 5.2%-8.2%.[1] The mean age of our study participants was 30.2 years, and most of them were poorly educated, and unbooked. A secondary analysis of the WHO global survey on maternal and perinatal health showed that maternal age ≥30 years, lack of antenatal care, and low level of education, were significantly associated with a higher risk of HDP.[10] Of the HDP, pre-eclampsia and eclampsia carry the greatest burden of maternal and perinatal morbidity and mortality.[20] Whereas 12% of all maternal deaths globally is attributable to eclampsia, pre-eclampsia is directly responsible for approximately 500,000 infant deaths, and 70,000 maternal deaths annually, making pre-eclampsia/eclampsia one of the three leading causes of maternal mortality and morbidity worldwide.[20,21] The incidence of HDP is higher in developing countries when compared to developed countries, due to paucity of, and poor access to quality pregnancy and emergency obstetric care in the former.[20] The increased frequency of pre-eclampsia/eclampsia in sub-Saharan African has also been linked to the high prevalence of anaemia, which is the commonest pregnancy complication in the region.[22] Severe anaemia has been reported to increase the risk of pre-eclampsia/eclampsia by at least three-fold.[10] These findings were corroborated by our study, which found pre-eclampsia and eclampsia to be the most common HDP, with all three maternal deaths recorded in our study, attributable to both disorders. The risk of death in women diagnosed with pre-eclampsia/eclampsia is four times higher than in normotensive mothers.[10]

Similar to other studies in the country and other developing countries, the eclamptic fits in our study occurred predominantly in the antepartum and intrapartum periods. This is in contrast to the observation in developed countries, where postpartum eclampsia is commoner.[24]

The lower incidence of antepartum and intrapartum eclampsia in the Western world is due to optimum antenatal care, early detection of preeclampsia, timely delivery of women with severe pre-eclampsia, and widespread prophylactic use of $MgSO_4$.[25] The most frequent predisposing factors to HDP found in our study included a family history of HDP, advanced maternal age, and new male partner. These findings may not be unconnected with the high incidence of HDP amongst black women, coupled with the high rate of polygamy, multiple sexual relationships, and infertility in Nigeria, with many women delaying childbearing for various reasons, including career.[26,27] Black women have a significantly higher risk of HDP in comparison to Caucasians.[22] The probability of a black woman having a relative with history of HDP is therefore, increased. The maternal risk factors of advanced maternal age and new male partner (as well as nulliparity) are hypothesised to be the result of age-mediated vascular damage and maternal immune maladaptation respectively.[28] Our study's perinatal mortality rate of 9% is in keeping with the reported perinatal mortality rate of 5.6%-11.8% that has been found in association with HDP.[29] Significant risk factors for perinatal mortality include prematurity, fetal growth restriction and abruptio placentae.[28,29] Abruptio placentae was the predominant maternal complication of HDP in our study, while prematurity was the most common perinatal complication. The high incidence of prematurity in our study may have been due to the fact that more than half of the women were delivered preterm. The definitive treatment for pre-eclampsia/eclampsia is delivery, and timely delivery (following maternal stabilisation) improves outcomes.[7,25] Our study gives credence to the findings by Ananth et al.[30] that women with HDP have a 40 to 80 fold increased risk of iatrogenic preterm delivery. Aside from a two-fold higher risk of perinatal death, preterm birth is also associated with a four-fold increase in low birth weight, birth asphyxia, and NICU admission, as observed in our study.[29] It is worth highlighting that majority of the women in our study with HDP were unbooked. Besides, the perinatal deaths recorded were predominantly from still births and severe birth asphyxia among the unbooked but mostly referred parturients with severe hypertensive disease. Our findings underscore the importance of routine antenatal care to enable detection of mothers with hypertensive disorders and permit good foetal surveillance like assessing foetal kick counts and biophysical profile, when necessary, to improve eventual foetal outcome. Even though just over half of the neonates born to mothers with HDP in this study when grouped by gestational age were considered premature, it is plausible the less than one percent of babies categorised as IUGR may have been underreported or misclassified since small for gestational age (SGA) babies who were less than 37 weeks' gestation could also be tagged preterm at delivery. Furthermore, this review highlights the often-ignored consequences of prolonged NICU admission and other potential problems of prematurity which could have been minimised through adequate supervision during antenatal care with maternal blood pressure monitoring and control.

Hydralazine, a direct acting smooth muscle relaxant, was the antihypertensive agent used in treating 95% of the women in our study. Labetalol (oral or intravenous),a mixed alpha/beta adrenergic antagonist, has been recommended by the National Institute for Health and Care Excellence (NICE) as first-choice antihypertensive agent for acute treatment of hypertensive crises.[21,31] However, hydralazine is the drug recommended by the Society of Obstetrics and Gynaecology of Nigeria (SOGON), and is the most widely used in low resource settings like ours, because it is cheaper, and more readily available.[7,32] Hydralazine and labetalol are equally effective for acute blood pressure control in women with HDP.[33] Ninety percent of the patients in our study received $MgSO_4$, which was administered using Pritchard regimen in all cases. $MgSO_4$ is the drug of choice for the

prevention and management of eclampsia.[24] It reduces the risk of eclampsia in women with pre-eclampsia by more than 50%.[34] Evidence from the Collaborative Eclampsia Trial show that women who receive $MgSO_4$ have a 52% and 67% lower risk of recurrent convulsions than those administered diazepam, and phenytoin, respectively.[35] Pritchard is the recommended regimen for the administration of $MgSO_4$ by both SOGON and the Nigerian Federal Ministry of Health (FMOH), and is also the preferred and most commonly used regimen in resource-constrained settings like ours, as it can be administered by lower-cadre maternity staff, with less risk of toxicity compared to the Zuspan regimen.[15] Even though majority of the women in our study were delivered through Caesarean section, vaginal delivery in women with HDP is a safe alternative, barring any contraindication to vaginal delivery.[7] HDP contributed significantly to the high Caesarean section rate of 42.4% in our Centre.[36] Choice of delivery route for women with HDP depends on the gestational age at presentation, maternal and foetal condition, as well as favourability of the cervix. Caesarean delivery is preferable if the woman is remote from term, cervix is unfavourable, or there is maternal or/and foetal compromise.

Limitations

This study is a single centre hospital-based study, and therefore the findings cannot be used to draw general conclusions. This limitation should therefore be factored in when interpreting the findings from this current research.

CONCLUSION

Hypertensive disorders of pregnancy are leading causes of maternal and perinatal morbidity and mortality especially in developing countries. Women should be adequately counseled on preconception care, early booking and regular antenatal care visits, with proper monitoring of blood pressure and urine protein. Prompt diagnosis and management are key in preventing the maternal and perinatal morbidity and mortality that are associated with these disorders.

ACKNOWLEDGEMENT

The authors appreciate the members of staff of our Institution's Medical Records Department for the roles they played in making this research a success.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The research work was examined and approved by the hospital research and ethics committee

REFERENCES

1. Nour NM. An Introduction to maternal mortality. Rev Obstet Gynecol. 2008;1(2):77-81.
2. Duley L. The global impact of pre-eclampsia and eclampsia. Semin Perinatol. 2009;33(3):130-7.
3. Umesawa M, Kobashi G. Epidemiology of hypertensive disorders in pregnancy: prevalence, risk factors, predictors and prognosis. Hypertens Res. 2017;40(3):213-20.
4. Itam IH, Ekabua JE. Socio-demographic determinants of eclampsia in Calabar; A ten-year review. Mary Slessor J Med. 2003;3:72-4.
5. Ugwu E, Dim CC, Okonkwo CD, Nwankwo TO. Maternal and perinatal outcome of severe pre-eclampsia in Enugu, Nigeria after introduction of magnesium sulphate. Niger J Clin Pract. 2011;14(4): 418-21.
6. Ebeigbe PN, Aziken ME. Early onset pregnancy-induced hypertension/eclampsia in Benin City, Nigeria. Niger J Clin Pract. 2010;13(4):388-93.
7. Kwawukume EY, Ekele BA. Hypertension in pregnancy. In: Kwawukume EY, Ekele BA, Danso KA, Emuveyan EE, editors. Comprehensive Obstetrics in the tropics. 2nd ed. Accra-North: Assemblies of God Literature Centre Ltd, 2015:219-31.
8. Jido TA, Yakasai IA. Preeclampsia: A review of the evidence. Ann Afr Med. 2013;12(2):75-85.
9. Rădulescu C, Bacârea A, Huțanu A, Gabor R, Dobreanu M. Placental Growth Factor, Soluble fms-Like Tyrosine Kinase 1, Soluble Endoglin, IL-6, and IL-16 as Biomarkers in Preeclampsia. Mediators Inflamm. 2016:3027363. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5069373/DOI:10.1155/2016/3027363 Accessed on 21 August 2021.
10. Bilano VL, Ota E, Ganchimeg T, Mori R, Souza JP. Risk Factors of Pre-Eclampsia/Eclampsia and Its Adverse Outcomes in Low- and Middle-Income Countries: a WHO Secondary Analysis. PLoS One. 2014;9(3):e91198 A
11. Waugh JS, Smith MC. Hypertensive disorders. In: Edmunds DK, editor. Dewhurst's textbook of Obstetrics and Gynaecology. 8th ed. UK: John Wiley and Sons, Ltd; 2012:101-10.
12. Sutherland A, Cooper DW, Howie PW, Liston WA, MacGillivray I. The incidence of severe pre-eclampsia amongst mothers and mothers-in-law of pre-eclamptics and controls. Br J Obstet Gynaecol. 1981;88(8):785-91.
13. Norwitz ER. Early pregnancy prediction of preeclampsia. UpToDate; 2021. Available at: https://www.uptodate.com/contents/early-pregnancy-prediction-of-preeclampsia?source=history_widget. Accessed on 21 August 2021.
14. Norwitz ER. Preeclampsia: Management and prognosis preeclampsia. UpToDate; 2021. Available at: https://www.uptodate.com/contents/preeclampsia-management-and-prognosis?source=history_widget. Accessed on 21 August 2021.
15. Orisabinone IB, Onwudiegwu U, Adeyemi AB, Oriji CP, Makinde OI. Shortened versus standard post-partum maintenance therapy of magnesium sulphate

in severe pre-eclampsia: a randomised control trial. Int J Reprod Contracept Obstet Gynecol. 2020;9(4): 1646-53.
16. Orisabinone IB, Onwudiegwu U, Adeyemi AB, Oriji PC, Makinde OI. Pattern of occurrence of severe preeclampsia among pregnant women in South-West Nigeria. Yen Med J. 2020;2(1):38-42.
17. Obagah L, Kasia BE, Jeremiah I, Allagoa DO, Aigere EOS, Kotingo EL, et al. Serum uric acid: a biochemical prognostic indicator of pregnancy outcomes among pre-eclampsia patients at the Federal Medical Centre, Yenagoa. Int J Reprod Contracept Obstet Gynecol. 2020;9(11):4344-9.
18. Obagah L, Jeremiah I, Allagoa DO, Aigere EOS, Kasia BE, Kotingo EL, et al. Prognostic accuracy of β hcg level in predicting pregnancy outcomes among pre-eclamptic patients at the Federal Medical Centre, Yenagoa. Yen Med J. 2020;2(2):30-7.
19. Aigere EOS, Allagoa DO, Kotingo EL, Obagah L, Kasia BE, Oriji PC. Accuracy of combined measure of serum uric acid and beta human chorionic gonadotropin (β hCG) versus serum beta human chorionic gonadotropin alone as prognostic indicators of pregnancy outcome of preeclampsia. J Advances Med Med Res. 2020;32(22):1-9.
20. Ghulmiyyah L, Sibai B. Maternal mortality from preeclampsia/eclampsia. In: Seminars in perinatology. USA: WB Saunders; 2012;36(1):56-9.
21. English FA, Kenny LC, McCarthy FP. Risk factors and effective management of preeclampsia. Integr Blood Press Control. 2015;8:7-12.
22. Fokom-Domgue J, Noubiap JJ. Diagnosis of hypertensive disorders of pregnancy in sub Saharan Africa: a poorly assessed but increasingly important issue. The J Clin Hypertens. 2015;17(1):70-3.
23. Bembalgi S, Kamate V, Shetty S. A comparative study of antepartum and postpartum eclampsia at a tertiary care centre. Int J Reprod Contracept Obstet Gynecol. 2016;5(6):1728-31.
24. Agida ET, Adeka BI, Jibril KA. Pregnancy outcome in eclamptics at the University of Abuja Teaching Hospital, Gwagwalada, Abuja: a 3-year review. Niger J Clin Pract. 2010;13(4):394-8.
25. Chames MC, Livingston JC, Ivester TS, Barton JR, Sibai BM. Late postpartum eclampsia: a preventable disease? Am J Obstet Gynecol. 2002;186(6):1174-7.
26. Orubuloye IO, Caldwell JC, Caldwell P. Sexual networking in the Ekiti District of Nigeria. Stud Fam Plan. 1991;22(2):61-73.
27. Okafor NI, Joe-Ikechebelu NN, Ikechebelu JI. Perceptions of infertility and in vitro fertilization treatment among married couples in Anambra State, Nigeria. Afr J Reprod Health. 2017;21(4):55-66.
28. Bartal MF, Sibai BM. Eclampsia in the 21st century. Am J Obstet Gynecol. 2020. S0002-9378(20)31128-5.
29. Hutcheon JA, Lisonkova S, Joseph KS. Epidemiology of pre-eclampsia and the other hypertensive disorders of pregnancy. Best Pract Res Clin Obstet Gynaecol. 2011;25(4):391-403.
30. Ananth CV, Savitz DA, Luther ER, Bowes Jr WA. Preeclampsia and preterm birth subtypes in Nova Scotia, 1986 to 1992. Am J Perinatol. 1997;14(01): 17-23.
31. Hypertension in pregnancy: diagnosis and management. NICE guideline NG133. Published 25 June 2019. Available at: https://www.nice.org.uk/guidance/ng133/chapter/Recommendations#management-of-gestational-hypertension. Accessed on 21 August 2021.
32. Guidelines for the management of severe preeclampsia and eclampsia. Available at: https://sogon.org/sogon-publications/sogon-guidelines-protocols/. Accessed on 21 August 2021.
33. Delgado De Pasquale S, Velarde R, Reyes O, De La Ossa K. Hydralazine vs labetalol for the treatment of severe hypertensive disorders of pregnancy. A randomized, controlled trial. Pregnancy Hypertens. 2014;4(1):19-22.
34. Duley L, Gülmezoglu AM, Henderson-Smart DJ, Chou D. Magnesium sulphate and other anticonvulsants for women with pre-eclampsia. Cochrane Database Syst Rev. 2010;2010(11): CD000025.
35. The Eclampsia Trial Collaborative. Which anticonvulsant for women with eclampsia? Evidence from the collaborative eclampsia trial. Lancet. 1995; 345(8963):1455-63.
36. Allagoa DO, Oriji PC, Tekenah ES, Obagah L, Ohaeri OS, Mbah KM, et al. Caesarean Section in a Tertiary Hospital in South-South, Nigeria: A 3-year Review. EJMED. 2021;3(2):122-7.

Cite this article as: Oriji PC, Allagoa DO, Ubom AE, Kattey AK, Briggs DC, Chika MN, et al. Hypertensive disorders in pregnancy at the Federal Medical Centre, Yenagoa, South-South Nigeria: a 5-year review. Int J Res Med Sci 2021;9:2923-9.