



Prevalence, Risk Factors and Maternal-Fetal Outcomes of Hypertensive Disorders in Pregnancy: A 5-Year Retrospective Review at a Cottage Hospital in Rivers State, Nigeria.

^{1,2}Aduloju O. P., ³Fajola A., ⁴Tuboteme D.S.

¹Sabbatical Research Advisor, Department of Community Health, Shell Petroleum Development Company of Nigeria Limited, Port-Harcourt, Nigeria, ²Department of Obstetrics and Gynecology, Ekiti State University, Ado-Ekiti, Nigeria, ³Regional Health Manager, Shell Petroleum Development Company of Nigeria Limited, Port-Harcourt, Nigeria, ⁴Maternity Unit, Obio Cottage Hospital, Port-Harcourt, Nigeria

Corresponding Author: O. P. Olusola; olusola.aduloju@eksu.edu.ng; peter.aduloju@yahoo.com

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ABSTRACT

Background: Hypertensive disorders of pregnancy (HDP) remains one of the major causes of maternal morbidity and mortality worldwide. This study determined the prevalence, risk factors and outcomes of hypertensive disorders in pregnancy among attendees at a Cottage Hospital in Port-Harcourt, Rivers State, Nigeria.

Methods: The study was a retrospective analysis of all pregnant women managed for HDP at Obio Cottage Hospital between January 2019 and December 2023. Relevant data were extracted using the study proforma and analysed using IBM SPSS version 26. Level of significance was set at P-value < 0.05.

Results: The prevalence of HDP was 4.7% while gestational hypertension was the commonest form of HDP (40.3%) and chronic hypertension with superimposed preeclampsia was the least (11.8%). History of chronic hypertension (13.3%) was the commonest risk factor identified and preterm delivery (6.8%) was the most common complication. More than half of the women delivered above 37 weeks (58.2%) and had induction of labour (56.3%). About 48.5% of the women delivered through the vaginal route and about 90% of the babies had Apgar scores of at least 7 at both 1 and 5 minutes.

Conclusions: Though the prevalence of HDP in this study was within the global rate, extremes of age, nulliparity, previous and family history of hypertension, DM and multiple pregnancy were identified risk factors. Regular antenatal care and prompt management of HDP based on established protocol will improve maternal and perinatal outcomes and reduce adverse outcomes of HDP.

Key words: Prevalence, Risk Factors, Outcomes, Hypertensive Disorders of Pregnancy

1. INTRODUCTION

Hypertensive disorders of pregnancy (HDP) remains a public health problem globally and one of the leading causes of maternal and perinatal morbidity and mortality¹⁻³. Hypertensive disorders of pregnancy refer to a spectrum of hypertensive diseases occurring during pregnancy with a global prevalence of 5.2-8.2% and contributing about 10-15% to maternal deaths annually worldwide^{1,4}. About 19-32% of maternal deaths in South Africa are due to hypertensive disorders of pregnancy while in Ghana, it is responsible for 9% of maternal deaths^{5,6}. In Nigeria, 5-10% of pregnancies are complicated by HDP with more antenatal admissions resulting from this than any other disorder and it accounts for 29% of all maternal deaths^{7,8}.

The International Society for the Study of Hypertension in Pregnancy (ISSHP) classified the disorders into gestational hypertension, gestational proteinuric hypertension (preeclampsia), chronic hypertension and chronic hypertension with superimposed preeclampsia⁹. Risk factors that have been identified with HDP include a first-time pregnancy, age, higher body mass index, smoking, dyslipidaemia, diabetes mellitus and renal disease¹⁰. Adverse maternal and fetal outcomes have been shown to be associated with HDP. The maternal complications include acute renal failure, acute hepatic failure, disseminated intravascular coagulopathy, HELLP syndrome, eclampsia, postpartum haemorrhage and maternal death while the adverse fetal outcomes are intrauterine growth restriction,

placental abruption, preterm delivery, low birth weight and perinatal death^{2,7,11,12}.

The management of a pregnant patient with elevated blood pressure involves controlling the blood pressure, identifying the presence of any complications, treating presenting symptoms, and reducing the risk of progression to eclampsia. Urgent or emergent lowering of the blood pressure might be required based on the presenting blood pressure and the presence of signs of end-organ dysfunction^{13,14}. Randomised controlled trials have shown that magnesium sulphate is effective for seizure prophylaxis in preeclamptic patients and for the prevention of recurrent seizures in eclamptic patients¹⁵.

This study determined the prevalence, risk factors and outcomes of hypertensive disorders in pregnancy among attendees in a Cottage Hospital in Port-Harcourt, Rivers State, Nigeria. There has been no previous study on hypertensive disorders of pregnancy in our centre and findings from this study will provide baseline information on management of HDP in the centre. The study would also provide basis for comparison with global findings, formulation of protocol to improve management of HDP and for comparison of trend in future reviews in the centre.

2. METHODOLOGY

This retrospective study was carried out at the Maternity unit of Obio Cottage Hospital, Port Harcourt between 1st January, 2019 and 31st December, 2023. Obio Cottage Hospital is a primary health centre upgraded by The Shell Petroleum Development Company of Nigeria Limited and its Joint Venture partners (SPDC-JV) in 2010 to provide affordable and accessible maternal and child health care. This is achieved through its Community Health Insurance Scheme (CHIS), a public-private partnership (PPP) involving the SPDC-JV partners, Rivers State Government, and the community. The monthly antenatal booking and antenatal clinic visits average at 400 and 2500 respectively with a delivery rate of about 260 babies every month. The antenatal clinic runs from Tuesday to Thursday while booking clinic runs on Mondays and Fridays. During the clinic, pregnant women are weighed and have their blood pressure checked and urine tested for glucose and protein. This allows us to detect pregnant women who may develop HDP and are subsequently managed according to our protocol for the management of hypertensive disorders of pregnancy.

Hypertensive disorders of pregnancy were classified in this study based on the classification described by the International Society for the Study of Hypertension in Pregnancy (ISSHP) which classified the disorders into gestational hypertension, gestational pro-

teinuric hypertension (preeclampsia), chronic hypertension and chronic hypertension with superimposed preeclampsia [9]. Hypertension in pregnancy was defined as systolic blood pressure (SBP) ≥ 140 mmHg and/or a diastolic blood pressure (DBP) ≥ 90 mmHg and Significant proteinuria using urine dipstick is described as 2+ or more of proteinuria in two catheter urine specimens or 1+ with specific gravity of less than 1.030 and pH less than 8. Gestational hypertension is elevated blood pressure that develops after 20 weeks of pregnancy while preeclampsia refers to the development of hypertension and significant proteinuria after 20 weeks of gestation. Chronic hypertension refers to high blood pressure that either precedes pregnancy, is diagnosed within the first 20 weeks of pregnancy or does not resolve by the 12th week postpartum and eclampsia was defined as the presence of generalized tonic-clonic seizures on the background preeclampsia^{7,9}.

All cases of pregnant women who were managed for HDP as defined above and delivered in the facility and followed up to six weeks after delivery were included in the study while those who did not deliver in the facility or were lost to follow up before the sixth week postpartum were excluded. Their folder numbers were compiled from the records in the antenatal, postnatal and labour wards and the theatre. The folders were retrieved from the Health Information Management Unit of the hospital and relevant data were extracted from the folders using a study proforma. Data extracted include sociodemographic characteristics of the women such as age, educational status, marital status, occupation, booking weight and obstetric data such as gravidity, parity, gestational age at booking, gestational age at diagnosis, gestational age at delivery, blood pressure at booking, blood pressure at the time of admission, mode of delivery, birth weight, Apgar scores at 1 and 5 minutes, perinatal and maternal complications

Data collected were analysed using IBM SPSS Statistics for Windows, version 26 (IBM Corp., Armonk, N.Y., USA). Categorical variables were presented in frequency and percentages while continuous variables were expressed in mean and standard deviation. Chi square was used in testing for significance for categorical variables and student t-test for continuous variables. P value < 0.05 was considered statistically significant.

Ethical consideration

The study was approved by the Ethics and Research Committee of the Community Health Department of Shell Petroleum Development Company of Nigeria.

Data Availability Statement

The data supporting the findings of this study is available on Open Science Forum (OSF) at <https://osf.io/pj37f/> or <https://osf.io/pj37f/files/osfstorage>

3. RESULTS

A There was a total of 14,483 deliveries over the study period and 687 women had hypertensive disorders of pregnancy (HDP) giving a prevalence of 4.7%. However, the prevalence of gestational hypertension was 1.4%, preeclampsia 1.9%, chronic hypertension 0.8% and that of chronic hypertension with superimposed preeclampsia was 0.6%. Out of the 687 women with HDP, 655 case records were available for analysis with a retrieval rate of 95.3%.

Table 1 shows that the mean age and mean booking weight of women with HDP were 28.9 ± 6.3 years and 62.5 ± 8.8 kg respectively with a median parity of 1. The mean systolic and diastolic

Table 1: Mean Values for Measured Variables of Women with Hypertensive Disorders of Pregnancy

Variables	Mean $\pm$ Standard Deviation
Age of Women	28.9 ± 6.3 years
Parity of Women	1.1 ± 1.2
Booking Weight	62.5 ± 8.8 kg
Gestational Age at Presentation	32.1 ± 2.4 Weeks
Gestational Age at Delivery	37.0 ± 2.0 Weeks
Systolic Blood Pressure	157.5 ± 19.3 mmHg
Diastolic Blood Pressure	101.9 ± 14.3 mmHg
Birth Weight	2.9 ± 0.7 kg

Table 2: Sociodemographic Characteristics of Women with Hypertensive Disorders of Pregnancy

Variables	Frequency (N=655)	Percentages(%)
Age of Women (Years)		
≤ 20	46	7.0
21-25	190	29.0
26-30	146	22.3
31-35	114	17.4
> 35	159	24.3
Education of Women		
No Formal Education	72	11.0
Primary	90	13.7
Secondary	157	24.0
Tertiary	336	51.3
Occupation of Women		
Unemployed	86	13.1
Self-Employed	197	30.1
Privately Employed	133	20.3
Government Employed	239	36.5
Parity of Women		
0	247	37.7
1	222	33.9
2-4	172	26.3
≥ 5	14	2.1
Gestational Age at Presentation (Weeks)		
≤ 28	6	0.9
28.1-33.6	511	78.0
34.0-36.6	121	18.5
≥ 37	17	2.6

blood pressure were 157.5 ± 19.3 mmHg and 101.9 ± 14.3 mmHg respectively. About three-quarters (75.6%) of the women were between 21-35 years and half (51.3%) of them had tertiary education. Other sociodemographic characteristics of the women are as stated in table 2.

Table 3 shows that majority (40.3%) of the women had gestational hypertension (preeclampsia) while chronic hypertension with superimposed preeclampsia was the least form of hypertensive disorders accounting for 11.8%. About half (52.1%) of the women had proteinuria. Past history of chronic hypertension was the commonest risk factor identified in about 13.3% of the women while preterm delivery (6.1%) was most common complication. Other risk factors and complications as shown in the table.

Table 4 reveals that about 58.2% of the women were delivered at a gestational age of 37 weeks or more with 56.3% of them undergoing induction of labour while, vaginal delivery was the commonest (48.5%) route of delivery. More than 90% of the babies were delivered alive with good Apgar scores at one and five minutes of at least 7. Other fetal outcomes are as stated in table 3.

4. DISCUSSION

The prevalence of hypertensive disorders of pregnancy (HDP) in our centre as revealed from this study was 4.7%. This rate is comparable to a prevalence of 4.9% reported by Adebajo et al⁷ from Southwest Nigeria and 3.7% reported by Mbachu et al¹⁵ from Southeast Nigeria. However, it is lower than reported prevalence of 5-10% from Bida Northwest Nigeria, Ibadan Southwest Nigeria, Benin-city Southsouth Nigeria, Ireland and Ethiopia¹⁶⁻²⁰. The variation in the rates might be due to the fact that these other centres are tertiary hospitals and being referral centres, they would manage a large number of high-risk pregnancies including HDP. Gestational hypertension was the most common HDP recorded in this study accounting for 40.3% with a prevalence of 1.9%. This is

Table 3: Hypertensive Disorders and Risk Factors

Variables	Frequency (N=655)	Percentages (%)
Types of Hypertensive Disorders		
Gestational Hypertension	264	40.3
Preeclampsia	195	29.7
Chronic Hypertension	119	18.2
Chronic Hypertension with Super-imposed Preeclampsia	77	11.8
Proteinuria		
Yes	341	52.1
No	314	47.9
Risk Factors		
Past History of Chronic Hypertension	87	13.3
Previous History of Preeclampsia	74	11.3
Diabetes Mellitus	44	6.7
Multiple Gestations	35	5.3
Family History of Hypertension	33	5.1
Smoking	0	0
Alcohol	0	0
Complications of hypertensive disorders		
Intrauterine Growth Restriction	14	2.1
Abruptio Placentae	14	2.1
Intrauterine Fetal Death	16	2.4
Pulmonary Oedema	4	0.6
Preterm Delivery	40	6.1
Low birth Weight	7	1.1
None	560	85.5

comparable to findings from other studies where gestational hypertension was reported as the commonest HDP^{6,16,21} but in contrast with the finding from the study by Corrigan et al¹⁹ that reported preeclampsia as the commonest hypertensive disorders of pregnancy.

Age and parity of the women are risk factors affecting the prevalence of HDP that have been reported in previous studies^{6,22,23}. The extremes of age have been documented in literature to be at higher risk of HDP and proven to be non-modifiable risk factor^{21,24}. This is corroborated by what we found out in this study where majority of the cases were in women below 25 years and above 35 years. Our study showed that majority of the women who had HDP were nulliparous while it was lowest in grand-multiparous women. This is similar to findings in other studies where nulliparous and grand-multiparous have been reported to be at increased risk of HDP especially gestational hypertension and pre-eclampsia^{6,21,22}. The influence of age and parity on the occurrence of hypertension in pregnancy further demonstrated that increasing maternal age and parity are associated with medical disorders of pregnancy including hypertension.

Other risk factors for HDP identified in this study include previous history of chronic hypertension and preeclampsia, multiple pregnancy and diabetes mellitus and these have been similarly reported in other studies^{19,21,22,25}. The authors opined that these findings are consistent with the theory of immune maladaptation and increasing maternal age which might play significant roles in the onset of hypertensive disorders of pregnancy^{19,21,22,25}. About 5% of the women with family history of hypertension in this review developed HDP and this corroborated previous studies where it was reported that women with maternal family history of hypertension were three times more likely to develop HDP compared to other women^{21,26,27}. These studies also revealed that a family history of hypertension is a risk factor that points towards worsening maternal outcomes^{21,26,27}.

Table 4: Maternal and Fetal Outcomes in Women with Hypertensive Disorders of Pregnancy

Variables	Frequency (N=655)	Percentages (%)
Gestational Age at Delivery (weeks)		
≤ 36.6	274	41.8
≥ 37	381	58.2
Mode of Delivery		
Spontaneous Vaginal Delivery	318	48.5
Emergency Caesarean Section	240	36.6
Elective Caesarean Section	97	14.8
Fetal Outcome		
Alive	638	97.4
Dead	17	2.6
Apgar Score at 1 Minute		
≤ 6	60	9.2
≥ 7	595	90.8
Apgar Score at 5 Minutes		
≤ 6	42	6.4
≥ 7	613	93.6
Birth Weight (kg)		
≤ 2.4	222	33.9
2.5-3.9	414	63.2
≥ 4	19	2.9
Admission into NICU		
Yes	54	8.2
No	601	91.8
Indications for Admission into NICU		
Mild Birth Asphyxia	14	2.1
Moderate Birth Asphyxia	9	1.4
Severe Birth Asphyxia	0.9	6
Prematurity	16	2.4
Sepsis	9	1.4
Maternal Complications		
Eclampsia	35	5.3
Postpartum Haemorrhage	23	3.5
Acute Kidney Injury	15	2.3
Maternal Death	10	1.5

Majority (51.5%) of the women with HDP were delivered by caesarean section which was similar to report of 51.7% by Tukur et al²⁸ but lower than 71.4% reported by Kooffreh et al²⁶ and higher than 45.4% by Corrigan et al¹⁹. This was due to the fact that most of the cases were rapidly progressing or severe at presentation and, therefore, required immediate delivery by the fastest route after stabilization which in most cases is caesarean delivery. This is evidenced by the mean blood pressure at presentation with systolic blood pressure of 157.5 ± 19.3 mmHg and diastolic blood pressure of 101.9 ± 14.3 mmHg and with 52.1% of the women having proteinuria. This was similarly expressed by Kooffreh et al²⁶ in their study.

The mean birth weight of the baby delivered to women with HDP in this study was 2.9 ± 0.7 kg and this is comparable to 2.7 kg reported by Singh et al²² and Kooffreh et al²⁶. The babies were of average birth weight and this might be due to the fact that majority of the women presented between 28-34 weeks gestation with mean gestational age at presentation of 32 weeks and were mostly delivered above 37 weeks with mean gestational age of delivery of 37 weeks. This might also account for the low incidence of preterm delivery and low birthweight babies in this study. This was supported by other studies^{22,26,29}.

The maternal and perinatal complications observed in this study included eclampsia, acute kidney injury, abruptio placentae, intra-uterine growth restriction, intrauterine fetal death and preterm delivery including maternal death from HDP among others were

not different from the documented findings in previous studies^{19,20,22,26}. However, we recorded few maternal and perinatal complications in this review probably as a result of regular antenatal care and prompt management of cases of HDP in our centre using the protocol and guidelines on management of HDP.

The limitations of this study include its retrospective design with the absence of some data set that could have been analysed. The study is also an hospital-based study which would mean that the result cannot be generalized to the entire population. However, the strength of this study lies in the fact that this is the first study on HDP in the centre and provides baseline information on the disease.

4.1 Conclusion

In conclusion, the study showed that the prevalence of HDP in our centre is within the global rate and gestational hypertension is the commonest type of HDP. Extremes of age, nulliparity, previous and family history of hypertension, DM and multiple pregnancy were identified risk factors for HDP. Regular antenatal care and prompt management of HDP based on established protocol will improve maternal and perinatal outcomes and reduce adverse outcomes of HDP.

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Contributor Roles Taxonomy (CRediT) Statement

OPA: Conceptualized the study, wrote initial manuscript draft, and made significant revisions to the content of the manuscript

FA: Analysed the data and made significant revisions to the content of the manuscript

TDS: Data acquisition and analysis

All authors approved the final draft of the manuscript

Conflicts of Interest:

The authors declare that they have no conflict of interest.

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