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Original Research Article

Incidence of gestational hypertension among pregnant women (2006-2015) in Enugu State, Southeast Nigeria: a retrospective study

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ABSTRACT

Background: Gestational hypertension (GHTN) is defined as a new rise in blood pressure (BP) ≥140/90 mm Hg, presenting at 20 weeks gestation without significant proteinuria. Worldwide, 4.4%-15% of all pregnancies are complicated by HTN. The aim of this study was to determine the incidence of GHTN among pregnant women in Enugu State, Southeast Nigeria with a view to improving and strengthening antenatal services in the State to help reduce the proportion of maternal mortality and fetal outcomes attributable to GHTN and reduce the overall prevalence of HTN in the country.
Methods: Records of BP, biodata and laboratory investigations (urinalysis, full blood count) of women who attended antenatal clinics in six selected state hospitals (2006-2015) were examined. Data were analyzed as proportions, t-test, ANOVA and Pearson product moment correlations using Maxstat (version 3.60) statistical software.
Results: The overall incidence of GHTN was 5.9% with annual fluctuations with peaks in 2010 and 2014. There were significant differences in incidence among the age groups (<20 years, 20-35 years and >35 years) ($p<0.0001$) and between nulliparous and multiparous women ($p=0.0016$). There was positive, strong and significant correlation between age (20-35 years and >35 years) and GHTN ($r=0.932$, $p=0.0069$). Between parity and GHTN, there was also positive, strong and significant correlation ($r=0.813$, $p=0.0491$).
Conclusions: With an incidence of GHTN at 5.9%, there is need to improve and sustain adequate antenatal services in order to help reduce the proportion of the country's maternal mortality attributable to hypertensive disorders of pregnancy.

Keywords: Blood pressure, Gestational, Hypertension, Multiparous, Nulliparous

INTRODUCTION

Gestational hypertension (GHTN), formerly known as pregnancy induced hypertension, is defined as a new rise in blood pressure (BP) ≥140/90mm Hg, presenting at or after 20 weeks gestation without significant proteinuria (≥ 300mg/24 hour urine collection of urine, or 2 specimens of urine collected ≥ 4 hours apart with ≥ 2+ on the protein reagent strip, or protein creatinine ratio (PCR) > 30mg/mmol) or other features of preeclampsia which usually resolves within 6-12 weeks of delivery.[1,2] It is the most frequent cause of hypertension during pregnancy, constituting approximately 70%, and complicating about 6-17% pregnancies in healthy nulliparous women and 2-4% in multiparous women.[3] Its incidence varies with the age and parity of the pregnant woman, being higher in younger nulliparous than older multiparous pregnant women.

Till date, the aetiology of GHTN has remained elusive, despite the number of studies that had been dedicated to hypertensive disorders of pregnancy. However, the speculated aetiological factors that appear to play a role in the development of GHTN include abnormal placentation, vasculopathy and inflammatory changes, immunological factors, genetic and nutritional factors.[4] In the pathogenesis of GHTN, the role of increased resistance in the utero-placental circulation resulting in impaired blood flow and subsequent poor placental perfusion has been suggested.[5] The pathophysiologic factors that have been indicted in GHTN include cardiovascular maladaptation and vasoconstriction, genetic predisposition, immunologic intolerance between feto-placental and maternal tissue, platelet activation and vascular endothelial dysfunction.[6]

Not every woman who becomes pregnant will develop GHTN. Only those who possess the predisposing risk factors (categorized into maternal and placental/fetal factors) will do so. The maternal risk factors identified by, include first pregnancy, new partner/paternity, age <18 years or >35years, black race, obesity (BMI ≥ 30), inter-pregnancy interval <2 years or > 10 years and use of selective serotonin reuptake inhibitors (SSRIs) beyond the first trimester; while placental/fetal risk factors include multiple gestation, hydrops fetalis, gestational trophoblastic disease and triploidy.[7]

To diagnose GHTN, especially when the pregnant woman is seen for the first time after 20 weeks gestation, or when there is no record of BP measurement before 20 weeks of pregnancy, is not always easy. However, the criteria that facilitate the diagnosis of GHTN and its differentiation from other hypertensive disorders of pregnancy include elevated BP, which was previously normal, absence of protein in urine and absence of manifestations of preeclampsia-eclampsia. Furthermore, in the differential diagnosis, spot urine PCR; full blood count (FBC); urea, creatinine, electrolytes; ultrasound assessment of fetal growth and amniotic fluid volume; and umbilical artery Doppler assessment can be included in the battery of tests that need to be done.[8]

Early and prompt diagnosis of this condition is essential as pregnancies complicated with hypertensive disorders are associated with increased risks of adverse fetal, neonatal and maternal outcomes. The risks include preterm birth, intrauterine growth restriction, perinatal death, antepartum haemorrhage, postpartum haemorrhage and maternal death.[9,10]

However, studies have shown that treatment of HTN of pregnancy does not alter the progression of the disease, although it can help to decrease the frequency of hypertensive crises and rate of neonatal complications.[11] The primary objective of treatment in women with severe HTN and preeclampsia therefore, is to prevent cerebral complications such as encephalopathy and haemorrhage. [12] Although the level at which antihypertensive treatment is initiated for non-severe HTN remains controversial, most physicians will commence treatment when the systolic BP is >140-170 mm Hg or diastolic BP>90-110mm Hg, targeting a mean arterial pressure of less than 125 mm Hg and avoiding overzealous BP control which may lead to placental hypoperfusion, and in turn compromise the fetus.[13]

The prognosis for GHTN is not the same for every pregnant woman with GHTN. Some of them will subsequently progress to preeclampsia, while others will not. For those who will progress to preeclampsia, the rate of progression depends on gestational age at time of diagnosis. 25%-50% with GHTN developed between 24 and 35 weeks gestation develop proteinuria and thus progress to preeclampsia.[3,10,14]

Worldwide, 4.4% -15% of all pregnancies are complicated by hypertension (HTN).[6,7,15-18]

In Nigeria, prevalence rates of hypertensive disorders of pregnancy range from 17% to 34.1%.[19-21] Studies solely dedicated to GHTN appear not to be available. Most of the studies focused on the other hypertensive disorders of pregnancy-chronic (preexisting) HTN, preeclampsia and eclampsia. However, an incidence of 20.8% for GHTN had been reported by in a study of pregnant women attending antenatal clinics in a Teaching Hospital in South-south Nigeria.[22]

Between 1990 and 2015, 10.7 million maternal deaths were reported globally, despite the fact that maternal mortality ratio had fallen by 44% over this period.[23] Out of this figure, developing countries account for approximately 99% of the global deaths in 2015, with Sub-Saharan Africa alone accounting for roughly 66%.

At the country level, Nigeria and India are estimated to account for over one third of all maternal deaths worldwide in 2015, contributing 19% and 15% respectively. In the West African sub-region, Nigeria with a maternal mortality ratio (MMR) of 814 ranks second, after Sierra Leone that has an MMR of 1360.[23] With this MMR, Nigeria could not meet the MDG5A target in 2015 (reduction of maternal mortality ratio by 75% of its 1990 level by 2015).

Among the causes of maternal mortality, hypertension ranks second (14%) only after haemorrhage.[24] In Nigeria, hypertensive disorders of pregnancy could be a contributory factor to the rising prevalence of HTN, which has been projected could reach 39.1 million by 2030 if the preset trend continues.[25]

Since studies have shown that GHTN constitutes about 70% of hypertensive disorders of pregnancy, its early detection and proper management could help to reduce the maternal and fetal complications (including maternal and perinatal mortalities and other outcomes associated with complicated GHTN) and the feeder effect of GHTN

on the prevalence of HTN in Nigeria, The aim of this study is to determine the incidence of GHTN among pregnant women in Enugu State, Southeast Nigeria, with a view to improving and strengthening antenatal care services in the health care system of the state in particular, and in the country in general, in order to bring down the proportion of maternal mortality and fetal outcomes attributable to GHTN and reduce the overall prevalence of HTN in the country.

METHODS

This was a case-control retrospective study. The study population was made up of all pregnant women who attended antenatal clinics in the selected hospitals from 2006 to 2015. The state was divided into zones and cluster sampling was used in selecting the six state hospitals from where the antenatal records were retrieved. A total of 14, 617 cases were reviewed. Included in the study were those pregnant women with newly arising HTN (BP= ≥140 mm Hg) at or after 20 weeks gestation without proteinuria or any other manifestation of preecalmpsia. Those with HTN diagnosed before 20 weeks gestation (preexisting or chronic HTN), with significant proteinuria, and seizures during pregnancy were excluded from the study.

The secondary data for the study were generated from the antenatal records of BP, biodata, urine testing and full blood count (and other tests to rule out preeclampsia) in the selected hospitals over a period of five months (July 2016-November 2016). Data were analyzed as proportions, t-test, ANOVA and Pearson product moment correlations using Maxstat (version 3.60) statistical software.

RESULTS

Table 1 shows the overall incidence of GHTN. The result shows that 5.9% (859 of 14617) of the pregnant women had GHTN, while the majority, 94.1% (13758 of 14617), had normal BP.

Table 1: Overall incidence of GHTN (no. of cases reviewed=14617).

Normal BP	HTN
13758 (94.1%)	859 (5.9%)

The annual trends in the incidence of GHTN (2006-2015) are shown in Table 2. From the result, it is seen that incidence of GHTN rises and falls over the period in review, with peaks in 2010 with 5.5% (72 of 1302) and 2014 with 7.2% (208 of 2901). The lowest incidence was observed in 2006 (1.9%), while the highest was in 2014 (7.2%).

Table 3 shows the incidence of GHTN according to age. The incidence is seen to be highest among the pregnant women of ages greater than 35 years with 13.5% (143 of 1059) compared to the women aged less than 20 years, with incidence of 9.1% (50 of 549) and the women aged 20-35 years, with 5.1% (666 of 13009) incidence. There were significant differences among the groups in the incidence of GHTN ($p<0.0001$). Between 20-35 years and >35 years, there was a strong, positive and significant correlation ($r= 0.932$, $p<0.0069$) between age and HTN. Between <20 years and 20-35 years, the correlation between age and HTN was positive, moderate ($r=0.487$) but not significant ($p=0.33$).

The incidence of GHTN according to parity is shown in Table 4. The result reveals that the incidence of GHTN was higher among the nulliparous women with 7.7% (190 of 2482) compared to the multiparous women with an incidence of 5.5% (669 of 12135). There was a significant difference in incidence between the two groups ($p=0.0016$). The correlation between parity and GHTN was strong, positive ($r=0.813$) and significant ($p=0.0491$).

Table 2: Annual trends in the incidence of GHTN (2006-2015) (No. of cases reviewed=14617).

Year	Normotensive	Hypertensive
2006	53 (98.1%)	1 (1.9%)
2007	191 (97%)	6 (3.0%)
2008	943 (95.4%)	45 (4.6)
2009	1164 (94.6%)	66 (5.4%)
2010	1230 (94.5%)	72 (5.5%)
2011	1165 (95.2%)	59 (4.8)
2012	1748 (95.6%)	81 (4.4)
2013	1652 (93.9%)	107 (6.1)
2014	2693 (92.8%)	208 (7.2%)
2015	2919 (93.2%)	214 (6.8%)

Table 3: Incidence of gestational HTN according to age.

BP(in mm Hg)	Normal BP	HTN	r	p
Age (in years)				
<20 years	499 (90.9%)	50 (9.1%)	0.487	0.33
20-35 years	12343 (94.9%)	666 (5.1%)		
>35 years	916 (86.5%)	143 (13.5%)	0.932	0.0069
F	29.945		<0.0001	

Table 4: Incidence of gestational HTN according to parity.

BP (in mm Hg)	Normal BP	HTN	r	p
Parity				
Nulliparous	2292 (92.3%)	190 (7.7%)	4.297	0.813
Multiparous	11466 (94.5%)	669 (5.5%)		
p-value	916 (86.5%)	143 (13.5%)	0.0016	0.0491

DISCUSSION

Hypertension is the most common medical problem encountered during pregnancy, complicating 2-15% of pregnancies.[6,16,26,7,31] As a matter of fact, hypertensive emergencies are the second leading cause of maternal mortality during pregnancy.[27] Statistics have shown that approximately one million women die worldwide from eclampsia.[28] Hypertensive disorders of pregnancy are classified into preeclampsia, chronic hypertension (primary or secondary), preeclampsia superimposed on chronic hypertension and gestational hypertension.[9] In literature, gestational hypertension (GHTN) is fast gaining popularity, replacing the older ambiguous term 'pregnancy induced hypertension'.[1] Various figures for the incidence of GHTN among pregnant women have been reported around the world by researchers in different countries. For instance, in Karachi, reported an incidence of 37%, while found 19.4% in Zimbabwe.[18,29] In Nigeria, found an incidence of 20.8%.[22] On the average, an incidence of 6-7% of GHTN has been reported globally.[2,7,13,15] The present study found an incidence of 5.9% of GHTN among the pregnant women who attended antenatal clinics in some selected district hospitals in Enugu State, Nigeria between 2006 and 2015. This finding is consistent with the global incidence of GHTN as has been reported.[2,7,15] However, the finding of the study was not comparable with what had been reported by and who reported much higher incidence, although for their respective countries.[18,22,29] The finding of a much lower incidence of GHTN in Nigeria compared to what had been reported by almost a decade ago, could reflect an improvement in antenatal services that has occurred in the country over the years.[22] In addition, this could also reflect regional differences in the incidence of GHTN, as conducted their own study in South-south Nigeria, whereas the present study was conducted in Southeast Nigeria.

The incidence of GHTN over the years in review (2006-2015) shows rising and falling trends, with peaks in 2010 and 2014. The annual fluctuations in the incidence of GHTN (with overall incidence of 5.9%) found in this study probably could have resulted from the inability of the health care delivery system in the state (Enugu) to sustain improved antenatal services which seemed to have been achieved in the South-eastern zone of the country in comparison with a much higher figure (20.8%) which had been reported from the South-south zone in 2007. Incomplete record keeping could also be a factor responsible for the apparently lower incidence in the first three years of the review (2006-2008) as valuable data would have been lost by the absence of these records (see Table 2), hence giving a false sense of security.

Age and parity are two of the identified maternal risk factors for the development of GHTN. Extremes of age (age below 20 years and above 35 years) are known to be associated with higher incidence of GHTN. Like the overall incidence of GHTN, incidence among various age groups and parity varies from place to place. In Karachi, [29] found an incidence of 9% among older women and 27% among primigravidae. However, reported an incidence of hypertensive disorders of pregnancy of 41.3% among 18-22 years old patients in their own study.[11] 53.8% of these study participants were primigravidae. The present study found an incidence of 13.5% in the pregnant women aged over 35 years, 9.1% in those aged below 20 years and 5.1% in 20-35 years age group. For 20-35 years and >35 years age groups, there was a strong, positive and significant correlation between age and incidence of GHTN (r=0.932, p= 0.0069). Between parity and GHTN, there was also a strong, positive and significant (r=0.813, p=0.0491). These findings are in line with known risk factors for the development of GHTN as have been described.[4,7,13,27,31] The finding of a higher incidence of GHTN among those pregnant women aged over 35 years compared to the other age groups (<20 years and 20-35 years) could be attributed to increased risk of GHTN associated with extremes of age of the pregnant woman, which is more among those in the upper extreme compared to those on the lower extreme. This could be the result of gradual rise in blood level of norepinephrine found in the plasma of individuals as age increases.[30] This rise probably is more marked in individuals with risk factors for hypertension than those without such factors. On the other hand, the finding of higher incidence in the nulliparous women (7.7%) compared to the multiparous ones (5.5%) which is consistent with the already known risk factors could be attributed to differences between nulliparous and multiparous pregnant women in the immunological tolerance/intolerance to the presence of the fetus *in utero*.[4,7,13,27,31] In GHTN, there is absence of blocking antibodies, decreased cell mediated immune responses, activation of neutrophils and involvement of cytokines.[4] As a matter of fact, these changes are more marked in nulliparous pregnant women than in the multiparous ones probably as a result of the phenomenon of immunological tolerance (to the presence of the fetus) which develops in

multiparous pregnant women following previous exposures during pregnancies.

Limitations of the study

Complete records for the 10 years period of review were not available in some of the health facilities included in the study. In such cases, mean of the available records was always taken as the hospital mean.

CONCLUSION

The overall incidence of GHTN among pregnant women in Enugu State, Southeast Nigeria (2006-2015) was found to be 5.9%. The study identified annual fluctuations in the incidence of GHTN (rising and falling trends between 2006 and 2015) among the pregnant women. The incidence of GHTN was highest among those women aged above 35 years (13.5%), compared to those aged less than 20 years (9.1%) and those aged 20-35 years (5.1%). The incidence was also higher in the nulliparous (primigravidae) (7.7%) compared to the multiparous ones (5.5%). There is need to improve and sustain adequate antenatal services paying particular attention to primigravidous and those pregnant women aged over 35 years in the state in particular and in Nigeria in general. There is also need for adequate record keeping to provide necessary data that will reflect the true situation of the problem in the state. Sustained improved antenatal services and reliable data would ultimately help to reduce the proportion of Nigeria's maternal mortality rate that is attributable to hypertensive disorders in general and GHTN in particular.

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