

**Research Article****The Effect of Chronic Hypertension on Perinatal Outcome****Isawumi A. I.\*, Akindele R.A., Fasanu A.O., Oboro V. O.**

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**Abstract:** This study is to evaluate the perinatal outcome associated with chronic hypertension in South-Western Nigerian women. All the cases of pre-existing hypertension managed over a 5-year period were reviewed and the outcome compared with those without pre-existing hypertension managed over the same period. Main outcome measures were rates of stillbirth, birth asphyxia and low birth weight. The stillbirth rate associated with essential hypertension was 143 deaths per 1000 births, and it was 78 for non-chronically hypertensive women (Relative risk [RR] 1.8, 95% confidence interval [CI] 1.2 – 2.8). Similarly, the risk of delivery of babies with low birth weight and birth asphyxia were increased in chronically hypertensive women (RR [CI] was 2.1 [1.6 – 2.9] and 2.0 [1.3 – 3.6] respectively. Superimposed pre-eclampsia were responsible for these increase in all the outcomes considered. We conclude that women with chronic hypertension have favourable perinatal outcomes if they do not develop superimposed pre-eclampsia.**Keywords:** Chronic hypertension, Morbidity, Mortality, Outcomes, Perinatal, Pre-eclampsia.

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**INTRODUCTION**

Non communicable diseases are on the increase in our society and chronic hypertension is one of the most common medical complications encountered during pregnancy [1, 2]. About 3% of all women eventually develop chronic hypertension, and such patients account for approximately 15-30% of all cases of hypertension in pregnancy [2, 3]. Much confusion concerning the management of pregnant hypertensive women has been caused by the variability in the incidence and severity of this condition, as well as the tendency of pregnancy to induce or aggravate hypertension [3]. While improved blood pressure control have been demonstrated in many pregnant women with underlying chronic hypertension, others have experienced dangerous deterioration of the condition accompanied by proteinuria or pathological oedema [4].

There are still controversies as to the optimal management of chronic hypertension in pregnancy. Treatment with antihypertensive medications has been found not to influence the outcome of the conditions in some studies, but there are limited data on which to draw conclusions. Thus, further research is required in this area. In our study, we aimed to identify the effects of chronic hypertension on perinatal outcome in our environment.

**MATERIALS AND METHODS**

The case records of all chronically hypertensive women who delivered at the Ladoko Akintola University Teaching Hospital, Osogbo over a 5-year period spanning 2010-2014 were analyzed. One hundred of such cases with sufficient information were reviewed for the study. The maternal demographic characteristics and perinatal outcomes were compared with those of control who are women that delivered after each case during the same study period. If hospital record of a control could not be retrieved, or did not contain sufficient information, the next suitable patient was selected. The planned ratio of case to control is 1:1. Data were analyzed with SPSS (Statistical Package for Social Sciences; SPSS, Inc., Chicago, IL). The maternal demographic characteristics analyzed include: the age, parity, presence of pre-eclampsia or diabetes mellitus. The perinatal outcomes analyzed were stillbirth rate, intrauterine fetal death, low birth weight and Apgar score.

For the purpose of this study, chronic hypertension was defined as a diastolic blood pressure of  $\geq 90$  mmHg that started before pregnancy or prior to the 20<sup>th</sup> week of pregnancy without having chronic renal disease [5, 6]. In the absence of this information, such diagnosis is based on persistence of hypertension beyond 6 weeks postpartum. The occurrence of proteinuria in pregnancy in such women is taken to indicate superimposed pre-eclampsia. Pre-eclampsia is taken to be the occurrence of a hypertension after 20

weeks of pregnancy associated with significant proteinuria, with the hypertension resolving within six weeks of the postnatal period. Significant proteinuria is any chart reference to a protein concentration of at least 300 mg in a 24-hour urine or 2+ on dipstick of mid-stream urine. Still birth is baby born without life after 28 weeks of gestation. Intrauterine death is macerated still birth with evidence of skin peeling, differentiated from fresh stillbirth which is an intrapartum event.

Demographic data were dichotomized, and expressed as percentages. They were compared between groups using the Chi square ( $\chi^2$ ) test. The perinatal outcomes were also expressed as binary (present or not present), and the relative risk (RR) of an outcome occurring in a cohort compared to a control were calculated along with the 95% confidence intervals (CI). Tests were taken as significant if the P value was less than 0.05 or the 95% confidence intervals excluded 1.00.

## RESULTS

### Characteristics of studied patients

During the study period spanning 2010-2014, we analyzed 100 case records of women with chronic hypertension. The demographic characteristics of the patients are shown in Table 1. Chronically hypertensive women are more likely to be aged above 35 years (68% versus 36%,  $p < 0.001$ ), multiparous (85% versus 53%,  $p < 0.001$ ) and to developed superimposed preeclampsia (36% versus 11%,  $p < 0.001$ ) or diabetes mellitus (11% versus 4%,  $p < 0.001$ ) compared with non-chronically hypertensive women.

### Stillbirth rate

Table 2 shows that the still birth rate with chronic hypertension was 143 deaths per 1000 births, and it was 78 deaths per 1000 births for women without chronic hypertension (Relative risk (RR) 1.82, 95% confidence interval (CI) 1.18 - 2.82). This increased risk of still birth associated with chronic hypertension was more evident for women with superimposed pre-eclampsia (205 deaths per 1000 births).

When women with pre-eclampsia were excluded from analysis the difference in stillbirths rates between the chronically and the non-chronically hypertensive women became non-significant (109 per thousand versus 66 per thousand with RR (CI) of 1.64(0.94-2.86). This suggests that the perinatal death accompanying chronic hypertension is mainly due to occurrence of superimposed pre-eclampsia. Superimposed pre-eclampsia occurred in over a third of all chronically hypertensive women in this study.

Superimposition of pre-eclampsia on chronic hypertension resulted in a two-fold increase in still birth rate (from 109 per thousand in women without pre-eclampsia to 205 per thousand in those with pre-eclampsia). The risk of still birth attributable to superimposed pre-eclampsia is therefore 96 deaths per thousand. For non-chronically hypertensive (control) women, the attributed risk for pre-eclampsia was 109 deaths per thousand. Thus, pre-eclampsia increased the stillbirth rate for infants of all women in this study both for those with or without chronic hypertension. Similarly diabetes increases the risk of still birth from 95 to 171 per thousand in chronically hypertensive women as well as from 63 to 133 per thousand in non-chronically hypertensive women.

### Timing of death

Still birth is a combination of fetal death in-utero before labour onset and intrapartum foetal death. The contribution of fetal death in-utero and intrapartum death to the increased risk of still birth associated with pre-eclampsia was further analyzed. For infants of case and control women who developed pre-eclampsia, the fetal mortality rate (fetal death in-utero) for case and control women were 151 per thousand and 120 per 1000 births respectively. On the other hand, the intrapartum still birth rates were 55 deaths per 1000 births and 49 deaths per 1000 births respectively. Thus, infants of chronically hypertensive women who had superimposed pre-eclampsia were about 3 times more likely to die in-utero than were infants of women with chronic hypertension who did not developed pre-eclampsia.

### Low birth weight

Infants of chronically hypertensives were significantly more likely to weigh 2500g or less than were those of non-chronically hypertensive women (RR 2.1, CI 1.6-2.9). As shown in Table 3 infants of women who developed pre-eclampsia in both case and control group has higher rates low birth weights than those who did not. Similarly, diabetes increases the risk of low birth weight babies from 9 to 22% in chronic hypertension and from 7 to 20% in women without chronic hypertension independent of the occurrence of pre-eclampsia.

### Apgar score

Babies of chronically hypertensive women had a significantly higher incidence of birth asphyxia (Apgar score  $< 4$  at 5 minutes) than those of women without chronic hypertension (14 versus 9%). As seen in Table 4 chronically hypertensive women who developed superimposed pre-eclampsia are at a higher risk of birth asphyxia. This also applies to the presence of diabetes mellitus.

**Table 1: Demographic characteristics of studied women**

	Cases	Control	p Value
Age category:			
> 35 years	68	36	0.001
<35years	32	64	
Superimposed pre-eclampsia:			
Present	36	11	0.001
Absent	64	89	
Diabetes mellitus:			
Present	11	4	0.001
Absent	89	96	
Parity:			
Nulliparas	15	47	0.001
Multiparas	85	53	

**Table 2: The perinatal mortality rate by presence of chronic hypertension and selected risk factors [Values given as n per 1000]**

	Cases	Control	RR (95%CI)
All women	143	78	1.82(1.18-2.82)
Women with pre-eclampsia	205	175	1.17(0.55-2.49)
(a) With diabetes	400	333	1.20(0.22-6.68)
(b) Without diabetes	179	162	1.10(0.48-2.53)
Women without eclampsia	109	66	1.64(0.94-2.86)
(a)With diabetes	171	133	1.28(0.30-5.49)
(b)Without diabetes	95	63	1.51(0.82-2.81)

**Table 3: The incidence of low birth weight (<2500g) by presence of chronic hyperetension and selected risk factors (Values given as %)**

	Cases	Control	RR (95%CI)
All women	28	13	2.13 (1.55-2.93)
Women without preeclampsia	57	55	1.03 (0.75-1.42)
Women with diabetes but no preeclampsia	22	20	1.10 (0.34 – 3.52)
Women without preeclampsia or diabetes	9	7	1.29 (0.70 – 2.39)

**Table 4: Rates of Birth Asphyxia (Apgar score <4 at 5 minutes) [Values given as %]**

	Cases	Control	RR (95%CI)
All women	14	7	2.00 (1.27 – 3.61)
Women without preeclampsia	25	25	1.01 (0.55-1.86)
Women with diabetes but no Preeclampsia	22	20	1.10 (0.34 – 3.52)
Women without preeclampsia Or diabetes	5	4	1.20 (0.51 – 2.79)

**DISCUSSION**

This study shows that babies of women with chronic hypertension had a significantly higher mortality than those of non –chronically hypertensive women. This increased risk for mortality was more evident for women with superimposed pre-eclampsia and least evident for women without superimposed pre-eclampsia. Thus the development of pre-eclampsia in a chronically hypertensive woman is the main factor responsible for the increased risk of perinatal mortality in these women. Hypertensive women who did not develop superimposed pre-eclampsia can look forward to a favourable outcome in terms of perinatal mortality [4, 6, 7].

The higher incidence of still birth for women with chronic hypertension observed in this study is consistent with findings from others. Lin *et al.* [8] evaluated the fetal outcome in 157 hypertensive pregnant women and found a high perinatal mortality rate of 134 per 1000 most (82%) of which was in women with superimposed pre-eclampsia. Sibai *et al.* [9] reported a similar finding in 211 patients with chronic hypertension where majority of perinatal deaths (5 out of 6) occurred among the patients with superimposed pre-eclampsia whereas for patients without superimposed pre-eclampsia there was only perinatal death. In the study by Ferrazzani *et al.* [10] the

perinatal mortality was extremely poor when proteinuric pre-eclampsia was superimposed on chronic hypertension, the rate being four times higher than in other groups. As observed in our study perinatal morbidity in terms of low birth weight and poor Apgar score at delivery was also secondary to superimposed pre eclampsia as in the study by Neerhol [11]. Thus, most of the mortality and morbidity associated with chronic hypertension in pregnancy is related to the development of superimposed pre-eclampsia.

Whereas, the overall stillbirth rate increases with the presence of chronic hypertension, the intra-partum mortality rate changes a little. Thus, an increase in the incidence of fetal death in-utero accounts primarily for the increase in still birth rates in chronically hypertensive women. Again this increase in intrauterine –death is primarily due to the superimposed pre-eclampsia and not necessarily the chronic hypertension itself. Pre-eclampsia has been associated with 2-4 fold increase in intrauterine fetal death in some studies [4, 7]. Uteroplacental dysfunction is presumed to be responsible for these deaths [7, 9].

The higher incidence of low birth weight for chronically hypertensive women in this study is also consistent with available data [10, 13]. The reported incidence of low birth weight for women with essential hypertension has been as high as 37% [14]. The explanation for this higher likelihood of delivery of low birth weight baby is not clear but prematurity due to earlier intervention and higher incidence of intrauterine growth restriction from impaired uteroplacental blood flow are adduced for the higher incidence of birth Asphyxia in this group of patients [12, 15]. Again the increased risk of low birth weight and birth Asphyxia appears to be mainly due to the presence of superimposed pre-eclampsia.

Regarding limitation, we could not retrieve the neonatal information from the paediatrics or records department hence, the use of still birth rate as a proxy for perinatal mortality in our study. Also our study did not address some potentially confounding variables such as medications used while others (pre-eclampsia. Diabetes) has been addressed. Chronically hypertensive women were likely to have associated diabetes mellitus than are non –chronically hypertensive patients. Further studies are necessary to evaluate the effects of other factors contributing to adverse perinatal outcome in hypertensive women.

## CONCLUSION

In summary, the group of women in this study who had pre-existing hypertension in pregnancy had higher incidence of perinatal death, low birth weight babies and birth asphyxia. The adverse perinatal outcomes were mainly attributable to development of superimposed pre-eclampsia and associated diabetes mellitus. Chronically hypertensive women who do not

develop pre-eclampsia can look forward to a favourable pregnancy outcome. Therefore, antenatal care is advocated for all pregnant women especially the chronically hypertensive ones to prevent development of pre-eclampsia and its deleterious effects on the babies [16].

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