



Emergent Acute Hypertension During Pregnancy-Anomaly or Future Trend?



Jimi Francis^{1*} and Darby Dickton²

¹College of Nursing and Health Sciences, University of Texas at Tyler, USA

²University of California, Davis Medical Center, USA

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***Corresponding author:** Jimi Francis, College of Nursing and Health Sciences, University of Texas at Tyler, USA

Abstract

Background: Hypertension during pregnancy is a complication that can be life-threatening for the mother/infant dyad. Women who are hypertensive during pregnancy experience higher rates of emergent complications which can lead to induction of labor or, in worst cases, cesarean-section delivery. For the infants, hypertension can cause complications such as intrauterine growth retardation, premature birth, and neonatal mortality. Is the rate of hypertension during pregnancy increasing?

Methods: A cohort retrospective chart review was conducted for a 12-month period to identify the number of patients who received a diagnosis of hypertension during pregnancy. Women with documented chronic hypertension were not included in the sample. The Institutional Review Boards for the participating hospital and University approved the study as exempt, using deidentified data.

Results: The total number of births for the 12-month period was 2763. The rate of hypertension diagnosed during pregnancy was 19% (n=530). Ethnicity did not correlate with diagnosis of gestational hypertension, but was significant for infant mortality rates.

Conclusion: These results have strongly demonstrated that the local rate of gestational hypertension is higher than the rate reported in the medical literature. Over one-third (36%) of the infants of hypertensive women in this study were delivered prematurely. Over one quarter (28%) of the infants were admitted to neonatal intensive care, and the infant mortality was quite high (47 per 1000), disproportionately so for Hispanic and Black infants. Further research could improve prevention strategies to develop healthier outcomes for mothers suffering from gestational hypertension.

Introduction

Modern medicine has provided a great many miracles across all fields, including mother-baby care. Yet, hypertension is a severe, contemporary complication that increases health risks for both mother and infant pre- and postpartum. This health complication has a longstanding history and is considered by some to be "unresolved and unpreventable" [1], though others have called it "the leading preventable cause of premature death" [2]. Presenting often as swollen extremities particularly of the feet and ankles [3], pregnant women can also develop shortness of breath, blurred vision, or headaches when afflicted with gestational hypertension [4]. Hypertension during pregnancy can be life-threatening for mother and infant [5] and has been identified as the second most common cause of direct maternal death during pregnancy [6,7]. It has been reported that hypertension during pregnancy may account for over one-third of preventable maternal deaths [8].

Women who are hypertensive during pregnancy experience higher rates of emergent complications which can lead to induction of labor or, in worst cases, cesarean-section delivery. They are also at risk for future hypertension and cardiovascular

disease [9,10] in addition to an exhaustive list of life-long implications for both the mother and the infant [11]. During the peripartum period the following have been noted as the most common fetal complications: intrauterine growth retardation, premature birth, and intrauterine death, or stillbirth, and neonatal death [12,13]. The increase in maternal blood pressure can cause decreased blood flow to the placenta, decreasing the amount of oxygen and nutrients available to the fetus, [14] which can lead to low birth weight or premature delivery of the infant [15]. In turn, prematurity can lead to breathing problems due to immature lungs, increased risk of infection and other complications for the neonate.

Gestational hypertension is reported to occur between 3 and 14%. [6, 16] Interestingly, the perception of local clinicians for the regional incidence of hypertension was higher than that reported in the medical literature. To address concerns, a retrospective chart review was conducted in a 402-bed acute care facility with services including maternal/infant services and neonatal intensive care. One objective of this large analysis was to identify the local

incidence of hypertension during pregnancy, based on diagnostic codes, and subsequent mortality complications of those with a hypertension diagnosis.

Methods

A cohort retrospective chart review was conducted for a 12-month period to identify the number of patients who received a diagnosis of hypertension during pregnancy. Women with documented chronic hypertension were not included in the sample. The Institutional Review Boards for the participating hospital and University recognized the study as exempt as any identifying information was de-identified in accordance with policy before receipt. Data was analyzed for demographics, maternal diagnosis codes, infant diagnosis codes, maternal pre-pregnancy height and weight, length of hospital stay, number of days of gestation at delivery, infant admission to NICU, and breastfeeding status at discharge. Only the data analysis for demographics, length of hospital stay, and infant mortality is reported in this brief communication.

Descriptive statistics and analysis of variance were used to assess the data with $p=0.05$. Height and weight were used to

calculate body mass index. T-tests were used to compare the two groups, hypertensive vs normotensive, for differences.

Result

The total number of births for the 12-month period included in this study were 2763 births. There were no significant differences between the normotensive participants and the hypertensive participants for age, BMI, or ethnicity. As shown in Table 1 and Figure 1.

Table 1: Group mean values were not statistically significant unless noted ($p \geq 0.083$).

N=2763	Normotensive N=2234	Hypertensive N=529
Maternal Age	24.6	26.1
BMI	28.1	26.8
Ethnicity		
Black	612	123
White	1547	305
Hispanic	498	90
Other	102	12

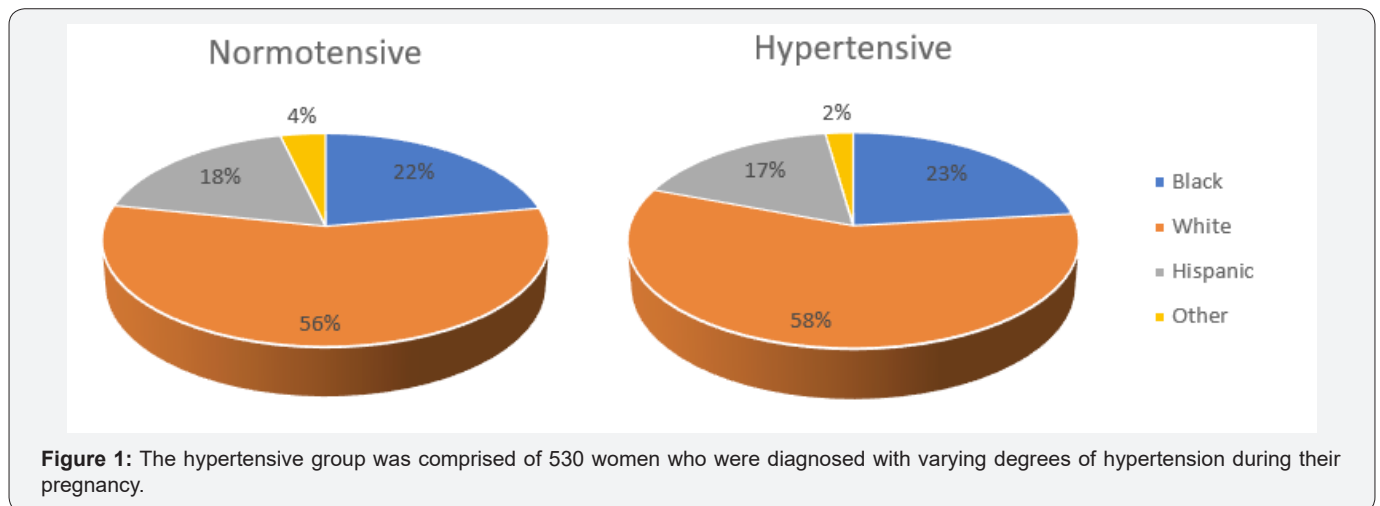


Figure 1: The hypertensive group was comprised of 530 women who were diagnosed with varying degrees of hypertension during their pregnancy.

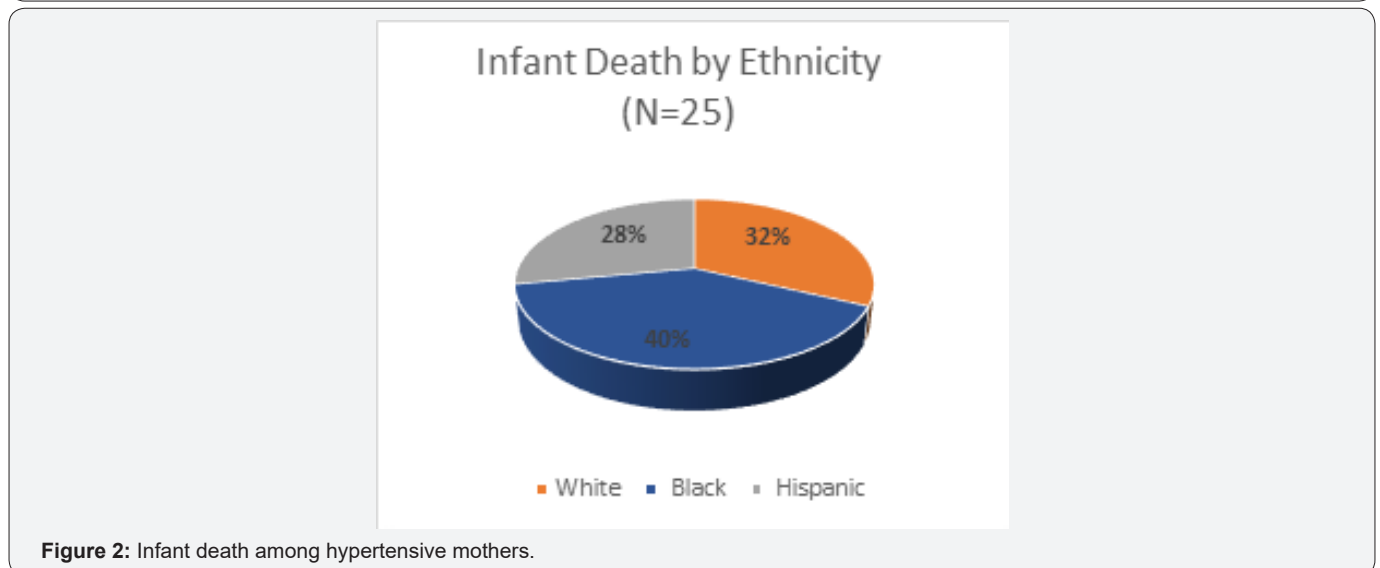


Figure 2: Infant death among hypertensive mothers.

Table 2: Hypertension categorized as per billing diagnosis codes.

N=530	Total	Resolved with or Shortly after Delivery	Hypertension Present at Discharge
Severe	191	90	101
Moderate	242	144	98
Mild	97	82	15

The hypertensive group was comprised of 530 women who were diagnosed with varying degrees of hypertension during their pregnancy. Based on the billing diagnostic codes that were provided for each patient, those with a diagnosis of hypertension were divided into categories of Severe, Moderate, and Mild as show in Table 2. The diagnosis codes for: Severe included acute hypertension, severe pre-eclampsia, eclampsia; Moderate included unspecified and mild pre-eclampsia; Mild included benign essential hypertension and transient hypertension.

The infants born of hypertensive women in this study were often delivered prematurely, with 191 infants born prior to 37-weeks gestation. Of the 530 infants born to hypertensive mothers, 148 were admitted to neonatal intensive care and 25 infants died in the neonatal period while eleven transferred to another hospital for advanced care and were lost to follow-up. Of the 25 infants that died, 8 were White, 10 were Black, and 7 were Hispanic. These differences were statistically significant ($p < 0.002$) (Figure 2).

Discussion

Hypertension at this hospital was categorized for charting and billing purposes during pregnancy as chronic hypertension, gestational hypertension, pre-eclampsia, and eclampsia. Chronic hypertension is the presence of hypertension prior to pregnancy and was not reported for this study. Blood pressure reading a of systolic pressure >140 mmHg and a diastolic pressure >90 mmHg diastolic pressure is considered hypertension, though in cases where patients have known blood pressure values across time through established prenatal care, hypertension can be diagnosed as an increase of 30 mmHg systolic and an increase of 15 mmHg diastolic pressure.

As per the diagnosis codes, gestational hypertension was defined by hypertension that develops after 20 weeks of gestation and resolves within 6 weeks postpartum; pre-eclampsia typically occurs after 20 weeks of gestation with or without urinary protein, liver transaminases that are elevated, pulmonary edema, as well as cerebral or visual symptoms. Eclampsia is defined by the occurrence of seizures in women with pre-eclampsia [14].

As the local clinical practitioners suspected, the rate of hypertension discovered during pregnancy in this study was higher than that reported in the medical literature. In our local analysis of pregnant women, 19% were diagnosed with hypertension (of various levels) during their pregnancy with almost half (214/530 40%) of those continuing to have hypertension on hospital discharge.

Over one-third (36%) of the infants of hypertensive women

in this study were delivered prematurely (or before 37 weeks gestation). Over one quarter (28%) of the infants were admitted to neonatal intensive care, and the infant mortality rate was quite high at a minimum of 4.7% as 11 infants were lost to follow-up. The rate of maternal deaths in the study group is unknown. While ethnicity was not a significant risk factor for the diagnosis of hypertension, it was significant for infant mortality in Black and Hispanic infants.

What are the risk factors that may be causative or correlated with acute emergent hypertension during pregnancy? A meta-analysis of observational studies determined that higher energy and lower magnesium intake were related to hypertension during pregnancy [17]. Similarly, supplementation with calcium and vitamin D has been suggested as way to mitigate risk of pre-eclampsia [18,19]. If dietary factors truly are a key component of minimizing risk for hypertension during pregnancy, then more research must be done to resolve this increasing incidence of gestational hypertension.

Conclusion

Obesity (reported as BMI over 30 in this study) and ethnicity have previously been reported as risk factors [20,21]. Yet, in this study those factors were not statistically significant as predictors for gestational hypertension. This leads us to speculate that, at least for this population, nutrient deficiencies may play a role in the development of hypertension during pregnancy.

Future studies need to investigate biomarkers of nutrients that may be related to emergent, acute hypertension during pregnancy as a means of developing a predictive model and better management of hypertension during pregnancy. Earlier diagnosis could lead to prevention of emergent hypertensive crises or the postpartum complications of severe hypertension. Studies to determine modifiable causal factors could lead to reduced morbidity and mortality of hypertension during pregnancy and possibly reverse this trend of increasing incidence in the local area.

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