



Unexpected finding of a high prevalence of perinatal hypertension in a rural Haitian village: An observational study

Bryce C Gagliano¹, Jorge C Cuza¹, Christopher G Porter¹, Samuel O Ewalefo¹, David M Vanderpool^{1,2}, Ruth L Bush^{*1}

ABSTRACT

Background

Hypertensive disorders in pregnancy are associated with maternal mortality worldwide. In Haiti, the risk of perinatal maternal death is high with sparse data concerning the prevalence of gestational hypertension (HTN) reported from remote regions. Maternal morbidity associated with HTN-related sequelae will place a strain on the family unit. Thus, it is vital to the health of mothers as well as the rural communities to gain a better understanding of HTN with the goal of decreasing perinatal morbidity and mortality in areas without access to advanced healthcare.

Methods

In this study, we measured the prevalence of HTN in perinatal women in the Thomazeau region of Haiti who presented to a regional clinic staffed by volunteer international providers. Retrospective pre- and postpartum data was analyzed from 436 women who presented between January 2013 and July 2015. Additionally, a subset of current (June-July 2015) prepartum (n=200) and postpartum (n=82) women had a urinalysis performed to assess for proteinuria and other urine markers. Demographic data collected included blood pressure, age, weight, height, gravidity, and parity. The criteria for HTN was defined as two blood pressure readings taken at separate time points with systolic and diastolic pressures greater than 140 and 90 mmHg, respectively.

Results

In this cohort of 436 women, 57 (13.1%) met the criteria of HTN before giving birth and 98 (22.5%) afterwards. Of the women found to be hypertensive, 64 (65.3%) of the hypertensive women after birth had not been hypertensive prepartum. Within the two-week current period assessing 282 women, 3 (1.5%) prepartum and 13 (15.9%) postpartum women with HTN had trace proteinuria.

Conclusions

In this cohort of rural women, we describe an unusually high prevalence of new onset postpartum HTN. As complications of gestational HTN including preeclampsia and eclampsia may contribute to perinatal morbidity and mortality for both mother and baby in developing countries, early identification with treatment is critical. Investigation into possible etiologies and prevention will be essential as peripartum health care is rare in rural Haiti. Deaths from HTN-related diseases can leave children parentless and perpetuate the cycle of poverty and lack of education in rural communities.

GJMEDPH 2016; Vol. 5, issue 6

¹Texas A&M University College of Medicine, Bryan, Texas

²LiveBeyond (Headquarters), Nashville, TN

*Corresponding Author:

Ruth L Bush

Texas A&M Health Science Center College of Medicine

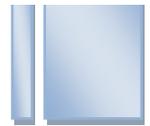
MS 1359 8447 State Highway 47, HPEB
3060 Bryan, TX 77807 – 3260

ruth.busho@gmail.com

Telephone No. 9794360092

Conflict of Interest—none

Funding—none



INTRODUCTION

Hypertensive disorders of pregnancy are a global health concern and associated with significant maternal mortality rates especially in low and middle income countries.^{1,2} Although often asymptomatic, hypertension (HTN) is a leading risk factor in many disease states including stroke, heart disease, and many others causing significant morbidity and mortality. HTN is commonly defined as a systolic pressure of greater than 140 mmHg and/or diastolic pressure of greater than 90 mmHg on at least two separate readings at least four hours apart. In relation to pregnancy, HTN is separated into two main categories: chronic and gestational. Chronic HTN is defined as HTN that has existed since before 20 weeks of gestation while gestational HTN presents as new onset HTN after 20 weeks gestation. Studies that have been conducted to estimate the prevalence of HTN in Haitian women found that approximately 33% suffered from HTN regardless of pregnancy status.³ Additionally, Haiti has one of the highest maternal mortality rates in the western hemisphere. Thus, a critical concern for pregnant and hypertensive Haitian women is the development of preeclampsia/eclampsia. While the incidence of preeclampsia in the United States is estimated at 2-3%, studies have shown that the incidence in Haiti to be as high as 18%.⁴ Furthermore, the prevalence of HTN-induced preeclampsia/eclampsia has been shown to contribute to 37.5% of all maternal mortality in Haiti.³

Extreme poverty, political, and geographical challenges have made studies in Haiti difficult to perform. Work still needs to be done in order to determine the prevalence of HTN throughout remote rural regions of the country. Conditions in these areas are harsh, with prevalent malnutrition and very limited access to advanced healthcare. Data from the World Health Organization estimates that between 10 and 15% of maternal deaths are associated with hypertensive disorders of pregnancy, and that 10% are associated with eclampsia. Worldwide over 500,000 women die each year of pregnancy-related causes with 99% of these deaths occurring in the developing world.⁵ It is vital to the health of mothers, as well as their communities, to gain a better understanding of the extent of HTN in these rural

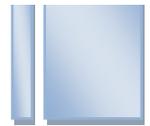
areas in order that proper treatment may be administered. In Haiti, Thomazeau is a rural district approximately 30 miles northeast of the capital city of Port-au-Prince. Poverty is prevalent and access to medical care is extremely limited. Due to logistical and resource challenges, data concerning HTN and the peripartum women is lacking for this region. This study will address the prevalence of HTN in a specific cohort of patients, perinatal women living in the Thomazeau region. The purpose of this study was to identify the prevalence of HTN in the rural population of peripartum women in Thomazeau in order to better understand the risk factors contributing to maternal death in the region.

MATERIAL AND METHODS

All data was collected from the LiveBeyond (www.livebeyond.org) Maternal Health Program in Thomazeau, Haiti, which was established in 2012. A Maternal Health program was started by local international healthcare providers in 2011 to provide the only basic perinatal care available in the region. Mothers present voluntarily to the weekly cost-free program which provides basic health care, nutrition, and education regarding perinatal care, the birth process, and infant care. Women receive perinatal vitamins and other limited prescription medications as needed.

Data was abstracted from paper-based health records that were handwritten and completed by trained bilingual staff members at the local clinic. Records were retrospectively reviewed from 436 women who had given birth between 11/19/2013 – 12/30/2015. This study was approved by the Institutional Review Board of Texas A & M University, College Station, TX.

The main data point of interest was HTN, which was defined as a blood pressure reading greater than 140/90 mmHg. Three of the highest blood pressures were recorded for the study cohort prior to parturition. Additional demographic data analyzed was age, delivery due date, gravidity and parity, number of living children, and maternal height and weight. Three of the highest postpartum blood pressure readings from the same data set were also



collected to determine the number of subjects suffering from postpartum hypertension.

A prospective pilot study was initiated by screening currently (June-July 2016) enrolled pregnant mothers in the maternal health clinic for HTN. If a patient had a blood pressure greater than 140/90 mmHg, she underwent a standard urinalysis. This was performed with urinalysis reagent strips (Siemens Multistix® 10 SG). Protein, leukocytes, blood, ketones, bilirubin, and glucose levels were recorded. Similar testing was done for current postpartum mothers. Pharmacotherapy for HTN was limited with only a week's supply of medication given at a time. Routinely used medications included nifedipine and hydralazine. Blood pressure was followed at weekly intervals until the HTN normalized after birth.

RESULTS

In this cohort of 436 women participating voluntarily in a rural maternal health clinic over the study time

period, the mean age was 26.6 ± 6.7 years (range 14-50 years). These mothers had had a mean of 3.4 prior pregnancies but only had 2.4 living children. Table 1 presents the demographic data for the cohort. Of these women, 57 (13.1%) and 98 (22.5%) met the criteria for pre-partum and postpartum HTN, respectively.

Out of the 98 women with post-partum HTN, 24 (24.5%) also demonstrated pre-partum HTN. Thus, 64 (65.3%) of the women with postpartum HTN were classified as having new-onset postpartum HTN (Table 2).

There was no association of age with systolic blood pressure readings (Figure 1). Overall, there was a 14.7% incidence of new-onset postpartum hypertension in the total cohort of 436 subjects.

Table 1 Description of Perinatal Clinic Cohort (n=436)

Variable	Mean \pm Standard Deviation	Range	Median
Age (years)	26.6 \pm 6.7	14-50	26
Weight (lbs)	132.0 \pm 20.4	75-194	130.1
Height (inches)	63.7 \pm 3.4	40-74	64
BMI (kg/m ²)	23.0 \pm 4.4	13.5-54.9	22.3
Gravidity	3.4 \pm 2.2	1.0-12.0	3
Parity	2.4 \pm 2.1	1.0-9.0	2

Table 2 Perinatal Cohort (N=436)

	Number	%
HTN Prepartum	57	13.1
Proteinuria	3	5.3
HTN Postpartum	98	22.5
Proteinuria	13	13.3
New Onset Postpartum HTN	64	14.7

During the week of the pilot cross-sectional study, 200 women were prepartum and 82 were postpartum (Table 3). Preclampsia and proteinuria were seen in 3 (1.5%). An additional 82 postpartum mothers were seen and 13 (15.9%) were found to have hypertensive

blood pressures. Urinalysis showed trace amounts of protein in 6 (15-30 mg/dL), moderate to trace amounts of leukocytes in 6, bilirubin in 4, and blood in 2.

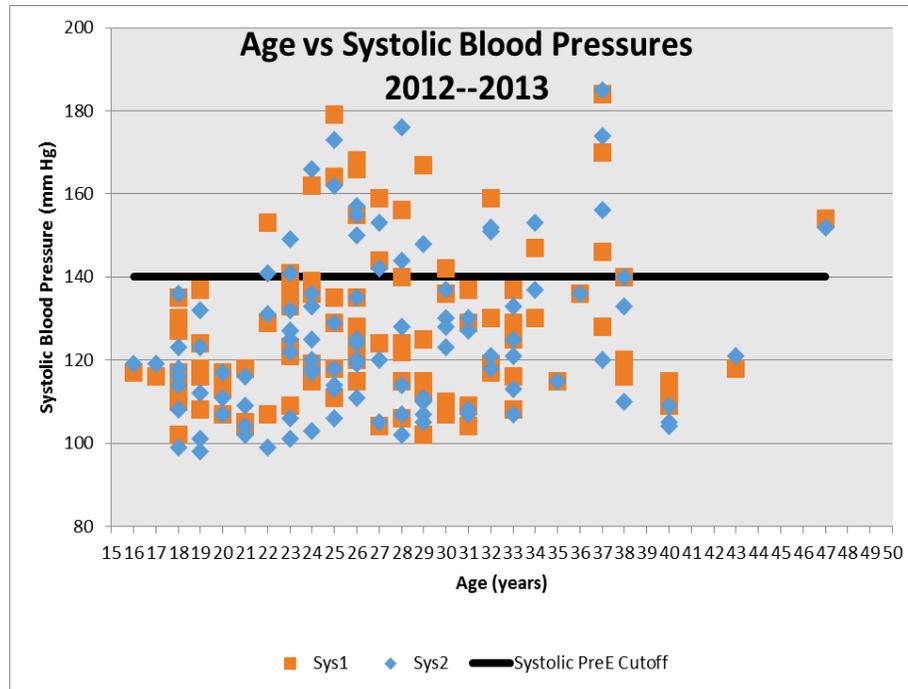


Fig 1 Age vs Systolic Blood Pressures (2012-2013)

Table 3 Pilot Study

	Number	%
HTN Prepartum (n=200)	3	1.5
Proteinuria	3	1.5
HTN Postpartum (n=82)	13	15.8
Proteinuria	6	7.31

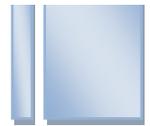
DISCUSSION

Hypertension in the perinatal period can affect several groups of women. These hypertensive disorders of pregnancy are categorized as chronic HTN, gestational HTN, pre-eclampsia, or eclampsia. In addition, pre-eclampsia may develop *de novo* for the first time in the postnatal period.⁶ Postpartum pre-eclampsia can occur for up to six weeks after giving birth.⁶ The underlying causes and clinical presentation of these types of HTN may vary, though most of the literature agrees on the need for aggressive management of hypertensive disorders to prevent future consequences. Women with pre-eclampsia have a 3.7-fold increased risk of future hypertension, 2.2-fold risk of ischemic heart disease, and 1.8-fold risk of stroke.⁷ HTN affects 6-10% of pregnancies, but few studies have reported the incidence of postpartum hypertension.⁷ The data is even more limited when considering rural low income

countries such as Haiti as maternal mortality is higher in women living in rural areas and among poorer communities.⁵

In this limited retrospective analysis from the Thomazeau region of Haiti, there was a high incidence (22.5%) of post-partum HTN in women with and without pre-partum HTN. There was also an unexpected finding of new onset post-partum HTN in 14.7% (64/436) of rural-residing women, none of whom had either chronic or gestational HTN. This incidence of newly-diagnosed HTN is unexplained and worrisome in this community and will require further investigation.

The United Nations Millennium Development Goals signed worldwide in 2000 included major topics of global health disparity: including the need to improve



maternal and child health.^{8,9} Since then, many monitoring and evaluation strategies have been enacted, including "Countdown to 2015" which was to monitor progress and intervention coverage to reach the goals.¹⁰ However, progress in achieving the goals has been slow, with only 13 of the 75 (17.3%) participating "Countdown" countries on track to reach the targets for reducing child mortality.⁹ Haiti is not one of the countries that has enjoyed improved maternal and child mortality rates. It is well-known that hypertensive disorders in pregnancy are associated with maternal mortality worldwide and indeed occur in Haiti.³ It is important to identify possible causes of these new cases of postpartum HTN as women in rural Haiti rarely have access to peri- or postpartum maternal health care. Of additional concern, postpartum HTN is well known to be an indicator of future blood pressure complications, including fetal death.¹¹ The maternal morbidity associated with HTN-related disorders places a strain on the family unit of the rural communities. Deaths from stroke, heart disease, or other hypertension related diseases can leave children without parents and perpetuate the cycle of poverty and lack of education. The development of plans to provide preventative care for common conditions such as HTN is essential to help bring stable health to the local communities. The implementation of cost-effective, evidence-based interventions proven to decrease the mortality rates in low- and middle-income countries need to be enacted on an extensive scale in Haiti, not just a few programs isolated in larger cities.

The data presented in this study provides insight into the prevalence of HTN in peripartum women in a rural community of Haiti. While it is important to monitor the incidence of chronic and gestational HTN, especially in the context of preeclampsia/eclampsia, our findings demonstrate a perplexing trend of new onset post-partum HTN without underlying signs of peri-partum disease. This finding is unexplained and warrants future study, as HTN is a leading risk factor for a number of life-threatening conditions. Consequently, these women with post-partum HTN may be at increased risk of developing HTN-related complications in future pregnancies.

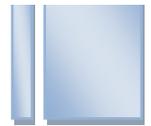
There were a few limitations related to the research setting. Although the local medical staff are trained by LiveBeyond personnel, the medical training is limited compared to what is expected in the United States. The perinatal intake forms are in English whereas the national language is Haitian Creole. Thus, some information could have been lost due to the inherent language barrier. Both dates of maternal birth and dates of last menstrual cycle must be estimated due to lack of documentation. The 2-week pilot study was only a cross-section and may not be representative of the women seen in the clinic. As could be imagined, there are many factors involved in the number of women seen each week as well as barriers to transportation and care. Additionally, there is no way to ensure quality control for equipment such as blood pressure cuffs, stethoscopes, and testing reagents utilized for taking measurements in this tropical climate with no access to sustained electricity in rural areas.

CONCLUSION

Women in this rural region of Haiti had a higher than expected prevalence of perinatal hypertension. Further investigation needs to be conducted to determine possible etiologies for the prevalence of new onset post-partum hypertension. The few studies that have been conducted in rural Haiti usually take place in hospitals which typically have more resources compared to small clinics in rural remote areas of Haiti. There is a great need for data collection and analysis to define the state of health care and to advocate for important medical resources for mothers and infants of rural Haiti. The impact could be remarkable by reducing the number of miscarriages, co-morbidities, and maternal mortality. This would translate into better family care, better childhood nutrition, education, and ultimately, more opportunities for the next generation.

REFERENCES

1. Barnes-Josiah D, Myntti C, Augustin A. The "three delays" as a framework for examining maternal mortality in Haiti. *Soc Sci Med* 1998;46:981-93.
2. Bryce J, Black RE, Victora CG. Millennium Development Goals 4 and 5: progress and challenges. *BMC Med* 2013;11:225.



3. Jacobs LD, Judd TM, Bhutta ZA. Addressing the Child and Maternal Mortality Crisis in Haiti through a Central Referral Hospital Providing Countrywide Care. *Perm J* 2016;20:59-70.
4. Raghuraman N, March MI, Hacker MR, Modest AM, Wenger J, Narcisse R, et al. Adverse maternal and fetal outcomes and deaths related to preeclampsia and eclampsia in Haiti. *Pregnancy Hypertens* 2014;4:279-86.
5. World Health Organization, Maternal mortality, Fact sheet N°348 (Accessed November 14, 2016, at <http://www.who.int/mediacentre/factsheets/fs348/en/>.)
6. Sibai BM. Etiology and management of postpartum hypertension-preeclampsia. *Am J Obstet Gynecol* 2012;206:470-5.
7. Bramham K, Nelson-Piercy C, Brown MJ, Chappell LC. Postpartum management of hypertension. *BMJ* 2013;346:f894.
8. Amibor P. What will it take to maintain the maternal and child health gains made in Haiti prior to the 2010 earthquake?: an analysis of past progress, trends, and the prospects for the realization of the United Nations Millennium Development Goals 4 and 5. *Matern Child Health J* 2013;17:1339-45.
9. Bhutta ZA. Integrated Strategies to Address Maternal and Child Health and Survival in Low-Income Settings: Implications for Haiti. *Perm J* 2016;20:94-5.
10. Barros AJ, Ronsmans C, Axelson H, Loaiza E, Bertoldi AD, Franca GV, et al. Equity in maternal, newborn, and child health interventions in Countdown to 2015: a retrospective review of survey data from 54 countries. *Lancet* 2012;379:1225-33.
11. Odell CD, Kotelchuck M, Chetty VK, Fowler J, Stubblefield PG, Orejuela M, et al. Maternal hypertension as a risk factor for low birth weight infants: comparison of Haitian and African-American women. *Matern Child Health J* 2006;10:39-46.