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Role of Gestational Hypertension and Eclampsia on Birth Weight in Georgia

Mehar Anand and Rushan Momin

Dr. Stephanie Eick

Dr. Mechelle Claridy

Dr. Skarlet Velasquez

Dr. Michael Welton

Mehar Anand Dr. Michael Welton

11011 Estates Circle Department of Epidemiology and Biostatistics

mka76957@uga.edu mdwelton@uga.edu

(678) 650-9543 (706) 542-6288

Rushan Momin Dr. Michael Welton

917 Riverbound Ct. Department of Epidemiology and Biostatistics

rim20785@uga.edu mdwelton@uga.edu

(706) 394-6678 (706) 542-6288

**I.** **Objective**

The objective of our current research is to investigate the association between gestational hypertension and hypertension eclampsia on low birth weight babies in Georgia. This relationship will aid in understanding and alleviating common health problems associated with low birth weight babies (American Pregnancy Association, 2016).

**II.** **Abstract**

A systematic review is a type of literature review that utilizes systematic and reproducible methods to collect and analyze data from research studies in the review. The systematic review summarizes primary research papers using documented methodology to fit the topic and eligible criteria (QUT, 2018). The characteristics of a systematic review include a set of objectives with defined eligibility for criteria to be involved in studies, an assessment of risk factors and risk of bias, and a synthesis of findings included in the studies (QUT, 2018). We also used bivariate analysis to determine whether there are differences between the two variables and what the significance of these differences are. Bivariate analysis is the simultaneous analysis of two variables or attributes, used to determine an empirical relationship between them and to test simple hypotheses of association. (Sayad, 2011). Bivariate analyses were used to determine the frequency between the risk factors, gestational hypertension and hypertension eclampsia, and low birth weight of babies in Georgia. Multivariable analysis was then conducted to observe and analyze more than one of our statistical outcome variables at a time (Lee, Greenberg, Quek, Clark, Laughon, Smith, & Hornik, 2017).

**III.** **Introduction**

Low birth weight babies are more likely to experience health problems as newborns compared to normal birth weight babies. Common health problems associated with low birth weight include respiratory distress syndrome, inability to fight infections, trouble staying warm, trouble feeding and gaining weight, and sudden infant death syndrome (SIDS)citation. Later in life low birth weight babies have a higher risk of diabetes, high blood pressure, heart disease, obesity, and intellectual and developmental disabilities. The percentage of low birth weight babies out of total live births in Georgia is historically higher than the United States average. In 2017, the percentage of low birth weight babies in Georgia live births was 9.5 compared to the national average of 8.1 (Lei, Fangliang et. al). Low birth weight is defined as a birthweight of 2,499 grams (5.5 pounds) or less. A maternal risk factor is a known cause that increases the chance of obtaining a certain outcome such as low birth weight. Examples of maternal risk factors for low birth weight include gestational hypertension, hypertension eclampsia, prior cesarean delivery, gestational diabetes, maternal age and height, multiparity, depression, hemorrhages (Lei et al., 2018).

One of the risk factors studied included gestational hypertension. It is also known as pregnancy-Induced Hypertension (PIH). High blood pressure during pregnancy can lead to preeclampsia, or protein in urine and high blood pressure. It develops after Week 20 in pregnancy and goes away after delivery (Hamilton et al., 2013). Gestational hypertension prevents the placenta from getting enough blood and can limit food and oxygen for baby, leading to low birth weight (Hamilton, Hoyert, Martin, Strobino, & Guyer, 2013).

The other risk factor we studied involved hypertension eclampsia. This occurs after Week 20 of pregnancy and is characterized by seizure development in a woman. The pregnant woman can have proteinuria, or protein in urine, and fluid retention (Boo, Lim, Koh, Lau, & Ravindran, 2008). Hypertension eclampsia can lead to blood clotting, pulmonary edemas, kidney injuries, seizures, and brain damage. This limits blood flow to the placenta due to abnormal or damaged blood vessels leading to fetal growth restriction and preterm birth (Boo et al., 2008).

In Georgia, the rate of low birth weight births is higher than the national rate and has increased slightly in recent years to close to 10%. Low birth weight babies are more likely to have health problems as infants and adults, including infections and chronic diseases.

Common health problems associated with low birth weight babies include Respiratory Distress Syndrome, Intraventricular Hemorrhages (bleeding in the brain), inability to fight infections, trouble feeding and gaining weight, Sudden Infant Death Syndrome (SIDS). Later in life, low birth weight babies have a higher risk of diabetes, high blood pressure, heart disease, obesity, intellectual and developmental disabilities (March of Dimes Association, 2018).

**IV.** **Materials and Methods**

Descriptive frequencies were used to describe the study population. The data set we utilized was from Georgia birth certificates (2014-2015). This study was conducted among live infants born between January 1, 2014 and December 31, 2015 in Georgia. Bivariate analysis was used to assess the independent association between each maternal risk factor and birthweight status. All variables with a p-value less than 0.05 in the bivariate will be considered for the multivariable logistic regression analysis. The program, SAS 9.4, was used for analyses. Frequencies may be missing due to missing data. Attributable risks were determined to calculate how low birth weight babies would be reduced if gestational hypertension and hypertension eclampsia were eliminated.

**V. Results**

**Table 1: Adjusted associations between select characteristics and low birth weight babies in Georgia: 2014 - 2015**

|  |  |
| --- | --- |
|  **Characteristics** | **Low Birth Weight Babies** |
|  | **Adjusted Odds Ratio** | **95% Confidence Interval** |
| **Race** |  |  |
| **White** | **REF** |  |
| **Black** | **2.08** | **2.02-2.15** |
| **Multiracial** | **1.40** | **1.28-1.53** |
| **Other** | **1.37** | **1.27-1.47** |
| **Insurance** |  |  |
| **Private, Non-government** | **REF** |  |
| **Public, Government** | **1.08** | **1.04-1.12** |
| **Military** | **0.83** | **0.77-0.90** |
| **Self-pay** | **1.36** | **1.30-1.43** |
| **Education** |  |  |
| **Less than high school** | **1.36** | **1.30-1.43** |
| **High school graduate** | **1.22** | **1.17-1.27** |
| **Some college** | **1.14** | **1.09-1.19** |
| **College graduate** | **REF** |  |
| **Hypertension Eclampsia****(HE)** |  |  |
| **Yes** | **7.04** | **5.70-8.69** |
| **No** | **REF** |  |
| **Gestational Hypertension (GH)** |  |  |
| **Yes** | **3.31** | **3.17-3.46** |
| **No** | **REF** |  |

 When calculating the prevalence of LBW in Georgia, we found a 9% prevalence, or 24,674 cases. After using multivariable analyses, indicators of gestational hypertension and hypertension eclampsia were associated with low birth weight babies in Georgia. For example, when compared to our reference variable, 1, women with gestational hypertension were 3.31 times more likely to have a low birth weight baby than women that do not have gestational hypertension. The calculated 95% confidence interval for this measure demonstrates a strong statistical significance, 3.17-3.46. The rate of LBW could be reduced by 15% if gestational hypertension in pregnancy is eliminated. When compared to our reference variable, 1, women with hypertension eclampsia were 7.04 times more likely to have a low birth weight baby than women who do not have hypertension eclampsia. The calculated 95% confidence interval for this measure demonstrates a strong statistical significance, 5.70-8.69. The rate of LBW could be reduced by 31% if hypertension eclampsia in pregnancy was eliminated.

We found statistically significant associations among all variables and their correlations with gestational hypertension and hypertension eclampsia. When compared to our reference variable, the women that are most likely to have LBW baby include black women, 2.08 times more likely, women who follow a self-pay lifestyle for insurance, 1.36 times more likely, and women who have received education less than high school, 1.36 times more likely.

**VI.**  **Discussion**

Table 1 displays how women with gestational hypertension are 3.31 times more likely to have a LBW baby, and how women with hypertension eclampsia are 7.04 times more likely to have a LBW baby in Georgia. This strong statistical association can be attributed to many determinants. In a study conducted by Fang, they discussed that pregnancy related hypertensive mothers and those with eclampsia had an increased risk of low birth weight. This can be attributed to a lack of access in certain geographic and congressional areas, a lack of access to prenatal and antenatal care, an absence of a clinician or specialist during the birth, and an absence of women reporting this data. Prenatal care is imperative in that it can help prevent complications during pregnancy, helping keep both the mother and the baby safe. Regular tests are completed throughout the pregnancy that may help prevent problems through screen tests and surveillance of bodily symptoms. Being provided regular prenatal care can help to have healthier and more full-term pregnancies, which may lead to a reduced prevalence of low birth weight babies in Georgia.

Women who were calculated to be most likely to have a LBW baby in Georgia include black women, 2.08 times more likely, women who follow a self-pay lifestyle for insurance, 1.36 times more likely, and women who have received education less than high school, 1.36 times more likely. One determinant to be considered is the level of chronic stress that black women endure, in comparison to other women. In a study conducted by Boo, the researchers discuss that chronic stress breaks down the nervous system, which weakens the ability of the uterine lining to support a fetus properly. Black women are likely to be subject to more racial profiling and discrimination, and less opportunities available to them (Boo et al., 2008).

Women who self-pay for their treatment, rather than have certain insurance plans, are also more likely to have a LBW baby in Georgia. This may be attributed to various reasons, such as only being able to provide for treatment when necessary, not being able to pay for an insurance plan or premiums or pay due to chronic and other preexisting conditions they may have. To counter this, policymakers can expand Medicare and Medicaid and Advantageous plans to all, or to enforce a universal health care system, so that these women are not left untreated.

Women who have not graduated from high school or have received an education less than high school are also at risk for having a LBW baby in Georgia. This may be attributed to characteristics such as not knowing enough information regarding prenatal care, not being able to access resources due to limited resources and low socioeconomic status, and limitations in opportunities for employment (Lei et al., 2018). To counter this, policy makers need to include more educational institutions or satellite institutions across these areas so that women can include more time and resources for their education before and after their pregnancies.

Our study includes many strengths that serve to be advantageous towards our objective and our calculations. Birth certificate data represents the only source of representative data by which we may analyze rare events or conduct detailed subgroup analyses of birth outcomes. Information found in these vital statistics allow for ongoing data collection and availability. They are also inexpensive and allow for a standardized manner of data collection.

We have limitation errors that need to be improved on, especially for future studies. Errors are common in birth certificate data and the reported data do not always accurately reflect the underlying variables of interest. We also did not measure the gestational age at which these women were experiencing symptoms of GH and HE, as this age may describe different stages of each condition and certain biomarkers in regard to their LBW baby.

**VII.** **Conclusion**

The objective of our current research is to determine whether there is an association between gestational hypertension and hypertension eclampsia on low birth weight babies in Georgia. We found an association between gestational hypertension and hypertension eclampsia with low birth weight babies in Georgia. The frequencies will aid in understanding and alleviating common health problems associated with low birth weight babies (American Pregnancy Association, 2016). We used bivariate and multivariable analyses to find significant correlations between gestational hypertension and hypertension eclampsia and low birth weight babies in Georgia.

Further analyses will be conducted for more in-depth results. We will utilize 2017-2018 Georgia Birth Certificate Data to conduct a follow up study, and to design a model that improves legislation and policy surrounding prenatal care for rural areas in which these women are concentrated. We will also control for confounding factors while conducting future studies.

**References**

American Pregnancy Association. (2016, March 01). Gestational Hypertension: Pregnancy

Induced Hypertension. Retrieved from<http://americanpregnancy.org/pregnancy->

complications/pregnancy-induced-hypertension/

Boo, N. L., SM; Koh, KT; Lau, KF; Ravindran, J. (2008). Risk factors associated with low

birth weight infants in the Malaysian population. Med J Malaysia., 63(4), 306-310.

Hamilton, B. E., Hoyert, D. L., Martin, J. A., Strobino, D. M., & Guyer, B. (2013). Annual

summary of vital statistics: 2010-2011. *Pediatrics*, *131*(3), 548-58.

Hunt, K. J., Marlow, N. M., Gebregziabher, M., Ellerbe, C. N., Mauldin, J., Mayorga, M. E.,

& Korte, J. E. (2012). Impact of maternal diabetes on birthweight is greater in non-

Hispanic blacks than in non-Hispanic whites. Diabetologia, 55(4), 971-980.

doi:10.1007/s00125-011-2430-z

Lee, J. H., Greenberg, R. G., Quek, B. H., Clark, R. H., Laughon, M. M., Smith, P. B., &

Hornik, C. P. (2017). Association between early echocardiography, therapy for patent

ductus arteriosus, and outcomes in very low birth weight infants. Cardiology in the

Young, 27(9), 1732-1739. doi:10.1017/S1047951117001081

Lei, F., Liu, D., Shen, Y., Zhang, L., Li, S., Liu, X., . . . Yan, H. (2018). Study on the

influence of pregnancy-induced hypertension on neonatal birth weight.

Journal of Investigative Medicine, 66(6), 1008-1014. doi:10.1136/jim-2017-000626

MayoClinic. (2017, April 28). Gestational diabetes - symptoms and causes. Retrieved from

<https://www.mayoclinic.org/diseases-conditions/gestational-diabetes/symptoms->

causes/syc-20355339

Mohan, A., Kumar, V., & Prateek, G. (2018). Maternal factors affecting newborn weight at

term - a study in a referral hospital. Journal of Evidence Based Medicine and Healthcare,

Vol 5, Iss 13, Pp 1115-1119 (2018) (13), 1115. doi:10.18410/jebmh/2018/231

Seghieri, G., Anichini, R., De Bellis, A., Alviggi, L., Franconi, F., & Breschi, M. C. (2002).

Relationship between gestational diabetes mellitus and low maternal birth weight.

Diabetes Care, 25(10), 1761-1765. doi:10.2337/diacare.25.10.1761

Szumilas, M. (2010). Explaining odds ratios. Journal of the Canadian Academy of Child and

Adolescent Psychiatry = Journal de l'Academie canadienne de psychiatrie de l'enfant et

de l'adolescent, 19(3), 227–229.

Tellapragada, C., Eshwara, V. K., Bhat, P., Acharya, S., Kamath, A., Bhat, S., . . .

Mukhopadhyay, C. (2016). Risk factors for preterm birth and low birth weight among

pregnant Indian women: a hospital-based prospective study. J Prev Med Public Health,

49(3), 165-175. doi:10.3961/jpmph.16.022

Williams, C. M., Asaolu, I., Chavan, N. R., Williamson, L. H., Lewis, A. M., Beaven, L., &

Ashford, K. B. (2018). Previous cesarean delivery associated withsubsequent preterm

birth in the United States. European Journal of Obstetrics & Gynecology & Reproductive

Biology, 229, 88–93. https://doi.org/10.1016/j.ejogrb.2018.08.013

Wood SL, Tang S, Crawford S. Cesarean delivery in the second stage of labor and the risk of

subsequent premature birth. American Journal Of Obstetrics And Gynecology.

2017;217(1):63.e1-63.e10. doi:10.1016/j.ajog.2017.03.006.

World Health Organization. (2004). Low birthweight.

<http://apps.who.int/iris/bitstream/handle/10665/43184/9280638327.pdf;jsessionid=091A0>

21E48F13C24627C719A892CF6C0?sequence=1

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