Introduction and Objective

- Maternal obesity is a risk factor for large for gestational age neonates (LGA) and macrosomia. Maternal hypertension is a risk factor for intrauterine growth restriction (IUGR) and small for gestational age (SGA) neonates. Neonatal growth abnormalities are associated with maternal and fetal morbidity and mortality.
- While it has been proven time and again that hypertension and obesity independently affect birthweight, little research has been done to establish the influence that both conditions have on birthweight.
- Understanding the combined affect of hypertension and obesity on birthweight will allow for overall improvement in maternal and neonatal care.
- Our objective is to evaluate the association between hypertension and obesity independently and the resultant growth abnormalities in the fetus and newborn.
- We hypothesize that obese women diagnosed with hypertensive disorders are more likely to deliver neonates with growth abnormalities compared to obese women without hypertensive disorders.

Methods

- Prospective nested cohort study
  - O-CHIP Trial (NCT02909582)
- Population:
  - Women who reached a BMI >35 kg/m² prior to or during their pregnancy and who delivered at tertiary academic institutions in Philadelphia, PA from 2016-2018. Analysis also included infant data.
- Intervention, Comparator, and Outcome
  - Development of a hypertensive disorder during pregnancy or not
  - Neonatal birthweight and presence of growth abnormalities
- Exclusion criteria:
  - Multiple gestations, pregnancies ending before 22 weeks, records lacking any information regarding delivery outcomes
- Variable Definitions:
  - Chart extraction to obtain information regarding hypertensive disorders, pregnancy weight, and neonatal outcomes
  - Growth abnormalities defined:
    - IUGR: ultrasound diagnosis
    - Macrosomia: birthweight >4500g
    - SGA and LGA: US based birthweight for gestational age reference
- Statistical Analysis:
  - $X^2$ for categorical variables
  - Independent samples t-test and ANOVA for continuous variables
  - Multiple logistic regression was performed to account for confounders

Results

<table>
<thead>
<tr>
<th>Hypertensive vs. Normotensive, N=264</th>
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<tbody>
<tr>
<td>Hypertensive Groups</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Chronic Hypertension</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>With Superimposed Preeclampsia</td>
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<tr>
<td>Gestational Hypertension</td>
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<tr>
<td>Pre-eclampsia</td>
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</tbody>
</table>

Table 4: Adjusted growth abnormality odds ratios among live births to hypertensive versus normotensive women

<table>
<thead>
<tr>
<th>Growth Abnormality</th>
<th>Odds Ratio</th>
<th>99% Confidence Interval</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal Growth Restriction &amp;/or Fetal Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normotensive Women (%)</td>
<td>referent</td>
<td>referent</td>
<td>referent</td>
</tr>
<tr>
<td>All Hypertensive Women (%)</td>
<td>referent</td>
<td>referent</td>
<td>referent</td>
</tr>
<tr>
<td>Chronic Hypertension</td>
<td>1.32</td>
<td>0.11</td>
<td>15.92</td>
</tr>
<tr>
<td>Preeclampsia*</td>
<td>1.03</td>
<td>0.32</td>
<td>3.35</td>
</tr>
<tr>
<td>Chronic hypertension without preeclampsia</td>
<td>0.79</td>
<td>0.44</td>
<td>1.41</td>
</tr>
<tr>
<td>Chronic hypertension with superimposed preeclampsia</td>
<td>0.94</td>
<td>0.76</td>
<td>1.15</td>
</tr>
</tbody>
</table>

Prevalence of Growth Abnormalities (n=70)

Obese women diagnosed with gestational hypertension were less likely to have a baby with a growth abnormality than normotensive women even when adjusting for confounders. (OR 0.32, 95% CI 0.11, 0.92, p=0.035). No difference was found for those diagnosed with any form of chronic hypertension or preeclampsia.

Conclusions

- Infants born to mothers with gestational hypertension are typically delivered at approximately 37 weeks. It is plausible that these neonates would have developed a growth abnormality if they were brought to term. However, this finding should not change standard prenatal care for these high risk patients.
- There is clinical significance in the number of growth abnormalities present in this cohort (24%). Since neonatal growth abnormalities were almost evenly distributed between normotensive and hypertensive women, the larger number presenting in this cohort may indicate the need for greater monitoring of obese patients with more frequent ultrasounds throughout pregnancy.
- Limitations:
  - Sample size
  - Restricting inclusions criteria to BMI >35 kg/m²
  - BMI criteria presenting throughout pregnancy as opposed to restricting to prior.

Acknowledgements

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- Thomas Jefferson University Department of Obstetrics and Gynecology

References