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# Evaluating the Relationship Between Maternal Vascular Reactivity Index at 24-30 Weeks Gestation and Neonatal Birth Outcomes

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Background: Hypertensive disorders of pregnancy (HDP) affect one in seven pregnancies in the US and can lead to adverse neonatal outcomes, including increased risks of fetal growth restriction, preterm birth, and incidence of cesarean section. Maternal endothelial dysfunction is implicated in the pathogenesis of HDP. A non-invasive and cost-effective method preemptively assessing the risk of HDP development during gestation does not currently exist. Vascular reactivity index (VRI) measures endothelial function through brachial artery occlusion and temperature rebound. Previous studies have shown that VRI is positively associated with well-regarded cardiovascular health indices, including the Framingham risk score and coronary artery calcification score. As endothelial dysfunction is strongly implicated in HDP's pathogenesis, VRI should be evaluated as a low-cost, non-invasive predictor of HDP development.

Objective: This study aimed to assess the relationship between maternal VRI between 24-30 weeks' gestation and neonatal birth outcomes (e.g. gestational age and birthweight).

Experimental Design: An IRB-approved study enrolled 43 pregnant women at or before 18 weeks' gestation receiving prenatal care at Nebraska Medicine. VRI was measured between 24-30 weeks' gestation using the Endothelix VENDYS machine per manufacturer protocol. For our purposes, a VRI below 1.0 was considered low reactivity, between 1.0-2.0 average reactivity, and above 2.0 high reactivity. Demographic data and clinical birth outcome data were collected from the electronic medical record (EMR). Spearman's correlation coefficients assessed the relationship between continuous neonatal birth outcomes and VRI. A linear regression was performed to adjust for relevant confounders: smoking, maternal age, and race. A p-value $< 0.05$ was considered statistically significant.

Results: Median gestational age at birth was 39.3 weeks, with 53.5% female neonate and 46.5% male. Median maternal age was 32 years old and median pre-pregnancy BMI was 26.2 kg/m2. Median VRI at 24-30 weeks gestation was 1.97 (IQR: 1.74-2.22). Based on the EMR, 53.5% of the women were normotensive and 46.5% had an HDP. Gestational VRI was found to be inversely correlated with birthweight percentile ($R = -0.450$, $p=0.002$) and gestational age ($R = -0.421$, $p=0.005$). After adjustment, both birthweight percentile and gestational age remained significant ($b=-0.317$ $p=0.044$, $b=-0.394$ $p=0.013$).

Conclusion: To our knowledge, our study is the first to assess gestational maternal VRI in relation to neonatal birth outcomes. Counter to our hypothesis, VRI appears to be inversely related to birthweight percentile and gestational age. Further studies with larger sample sizes are needed to explore this trend, along with stratification of infant sex.