Median carotid-femoral pulse wave velocity for the early prediction of gestational diabetes and hypertensive disorders of pregnancy

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Introduction: Gestational diabetes mellitus and hypertensive disorders of pregnancy (i.e. gestational hypertension and pre-eclampsia) are important complications of pregnancy and are leading causes of both fetal and maternal morbidity and mortality as well as long-term health problems. Early prediction for these conditions remains difficult. Arterial stiffness, shown to be an independent predictor of cardiovascular health, may represent a useful tool for the detection of vascular dysfunction underlying these obstetric conditions. The objective of this ongoing study is to evaluate the performance of arterial stiffness as a predictive tool for these complications as compared to uterine artery Doppler ultrasonography.

Methods: In this prospective longitudinal study of women with high-risk pregnancies, arterial hemodynamics and stiffness was evaluated at each trimester, within 24 hours of delivery, and at six weeks post-partum. A uterine artery Doppler was also performed at the routine second trimester ultrasound scan.

Results: Of the 38 participants recruited (maternal age: 37.5 ± 4.0), five developed gestational diabetes, two developed gestational hypertension, and one developed pre-eclampsia. There were no significant differences in carotid-femoral pulse wave velocity (p = 0.14), carotid-radial pulse wave velocity (p = 0.10), augmentation index (alone [p = 0.32] or adjusted for a heart rate of 75 beats per minutes [p = 0.79]), subendocardial viability ratio (p = 0.66). However, in the first trimester, using the median cfPWV as a cut-off, 87.5% of participants that developed a composite outcome were identified. In the second trimester, the use of either an abnormal resistance index or pulsatility index or the presence of notching identified 25.0% of participants that developed a composite outcome.

Discussion: Within a high-risk population, the median cfPWV cutoff was more useful than uterine artery Doppler as an earlier and more useful tool for the identification of participants that went on to develop either gestational diabetes or a hypertensive disorder of pregnancy.

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No conflict of interest.