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Is maternal blood pressure during pregnancy associated with infant arterial stiffness?

Ka Ying Bonnie Ng¹, Janet E Cade², Darren C Greenwood³, Harry J McArdle,⁴ Nigel A B Simpson⁵, Nisreen A Alwan⁶

¹Department of Obstetrics and Gynaecology, Princess Anne Hospital, Southampton, SO16 5YA

²Nutritional Epidemiology Group, School of Food Science and Nutrition, University of Leeds, LS2 9JT

³Division of Epidemiology and Biostatistics, School of Medicine, University of Leeds

⁶Academic Unit of Primary Care and Population Sciences, Faculty of Medicine, University of Southampton

Introduction: In adults, arterial stiffness measured by pulse wave velocity (PWV) is regarded as a predictor of cardiovascular disease [1]. This association is less well established in infants, however. Infant and childhood vascular development is dependent on several factors related to the pregnancy, including maternal blood pressure (BP) with one study finding an inverse relationship between BP and neonatal aortic PWV at 1-3 days [2].

Objective: To assess the association between maternal BP in pregnancy and infant brachio-femoral PWV at age 2-6 weeks.

Methods: The Baby VIP study recruited mother-baby pairs from postnatal wards at Leeds Teaching Hospitals NHS Trust. PWV was measured non-invasively in 284 babies at a home visit 2-6 weeks after recruitment using the Vicorder device. Maternal BP at booking and at 36 weeks gestation, along with other co-variables, were collected from delivery and antenatal notes. Multivariable linear regression models were used to link maternal systolic and diastolic BPs, and BP change from booking to 36 weeks with PWV.

Results: At booking, the mean maternal systolic BP was 112 mmHg (standard deviation (s.d) 12) and diastolic BP was 67 mmHg (s.d 10). At 36 weeks gestation, mean maternal systolic BP was 116.3 mmHg (s.d 15) and diastolic BP was 70.8 mmHg (s.d 12). Mean infant PWV was 6.7 m/s (s.d 1.3). Infant PWV was not significantly associated with maternal hypertension in pregnancy (at booking or at 36 weeks) in univariate analysis, where hypertension was defined as systolic BP ≥ 140 mmHg or diastolic BP ≥ 90 mmHg, or a rise in systolic BP of ≥ 30 mmHg or rise in diastolic BP of ≥ 15 mmHg from booking to 36 weeks ($p > 0.05$). There was no association between infant PWV and maternal systolic BP at 36 weeks assessed as a continuous variable (regression co-efficient 0.003 m/s, 95% confidence intervals (CI) -0.01, 0.01, $p = 0.6$) adjusted for pregnancy factors including maternal age, ethnicity, history of gestational diabetes, pre-eclampsia, anaemia and infant factors including baby's age, position, whether sleep or awake at the time of measurement, and prematurity. There was no association between infant PWV and a ≥ 30 mmHg rise in systolic BP at 36 weeks from booking (adjusted regression co-efficient -0.4 m/s, 95% CI -1.1, 0.41, $p = 0.4$).

Conclusions: This study has shown that there is no evidence of any associations between infant PWV and hypertension or maternal BP during pregnancy. We demonstrate the feasibility and acceptability of using PWV in early infancy. However, further studies are required to determine the predictors of infant PWV, the significance and long term implications of PWV measurements in infants.

References:

[1] Laurent, S., et al., *Expert consensus document on arterial stiffness: methodological issues and clinical applications*. Eur Heart J, 2006. **27**(21): p. 2588-605.

[2] Koulsi, A., et al., *Maternal and neonatal influences on, and reproducibility of, neonatal aortic pulse wave velocity*. Hypertension, 2007. **49**(1): p. 225-31.