

ABSTRACT

Forearm blood flow and vascular resistance in relation to weight and proportions at birth.

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Recent studies in animals and humans have reported a consistent inverse relationship between birthweight and subsequent level of blood pressure. However, the mechanisms underlying this association are largely unknown.

This thesis examines the relations between birth measures and cardiovascular measurements in children. The study was conducted in two phases. In the first phase, children born at term (38-41 weeks gestation) ages 14-16 years were randomly selected from the lowest and uppermost quintiles of a population based on birthweight /placental weight ratio. These children underwent a cold pressor test during which blood pressure, pulse rate and forearm blood flow were measured. The results showed no significant differences among the groups after analysis by birthweights and placental/birthweight ratio.

In the second phase of the investigation, a younger group of children ages 9-12 years, born at term were randomly selected from the upper middle and lowest quintiles of the population ranked by birthweights. These children underwent an identical cold pressor test. In addition, mental arithmetic testing and a lying to standing maneuver were carried out. Forearm blood flow, blood pressure and pulse rate were measured during the cold pressor and mental arithmetic tests while blood pressure and pulse rate only were measured during the lying to standing maneuver.

In this second phase of the study, an increased forearm vascular resistance was found in children with the lowest birthweights. This study demonstrates for the first time an increased vascular responsiveness in children who, are at increased risk for hypertension based on their birthweights. These children experienced growth constraint in fetal life probably as a result of maternal nutrition as suggested by the findings that smaller babies were born to women who were lighter and gained less weight in pregnancy.