

ABSTRACT

Fetal Growth and Lipid Metabolism in Trinidadian Women

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This dissertation examines inherent relationships that exist between a pregnant woman and her conceptus within the West Indian patria. Fetal growth is characterized not solely by a mother's genetic endowment, but by her innate ability to mobilize nutrients, specifically in the form of fatty acids, to her developing fetus. This ability, as marked by her anthropometry, has important implications for future development, since fetal outcome characterizes a predisposition to the acquisition of non-communicable diseases in adults, such as cardiovascular disease and diabetes mellitus. The proclivity to these diseases is further complicated by ethnic diversity, with the local patria of Trinidad being an example.

A cross-sectional study was conducted using a total of three hundred and two (302) healthy, pregnant and non-pregnant women presenting at the antenatal clinics of various health centers throughout Trinidad. Blood was drawn at two specific gestational periods and anthropometric variables obtained. Cord blood was obtained at birth. Fatty acid content was determined using gas-chromatography flame-ionization detection (GC-FID).

After adjusting for maternal height, change in weight during pregnancy and BMI change, there was a statistically significant linear relationship between maternal weight at 38 - 40 weeks gestation and birth weight ($Y = (\text{covariates}) + .79x + 2286$, $F = 14.334$, $p < 0.0005$). Triglyceride concentration increased to a greater extent in Indo-Trinidadian women (>257%), but was generally lower than reported in the literature for Caucasian Europeans. The concentration of arachidonic acid and docosahexaenoic acid were substantially greater in blood drawn from the umbilical cord than in maternal circulation, whereas the concentration of linoleic acid was reduced in the umbilical cord at term (>62%).

The results obtained from this study supported the conclusions that: a one-unit (1 Kg) increase in maternal weight at 38 - 40 weeks gestation was associated with a 0.79 gram increase in birth weight after removing the effects of covariables. A triglyceride concentration greater than 1.74 mmol/L was predictive of birth weights greater than 3000 grams. Docosahexaenoic acid is unlikely to arise from the desaturation and elongation of alpha-linolenic acid or eicosapentaenoic acid in the developing fetus. The placenta is able to desaturate and elongate linoleic acid to form arachidonic acid. Fatty acids, particularly docosahexaenoic acid are selectively enriched in the phosphatidylcholine fraction of plasma lipids.

Keywords: Derek Emmanuel; Fetal growth; anthropometry; fatty acids; and ethnic diversity.