Plasma Acylcarnitines During Pregnancy and Neonatal Anthropometry: A Longitudinal Study in a Multiracial Cohort

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Objectives: Plasma profile of acylcarnitines has been suggested to associate with adverse maternal outcomes such as gestational diabetes. However, data on their associations with neonatal outcomes are sparse. Therefore, this study aimed to examine the prospective profile of acylcarnitines across gestation and its association with neonatal anthropometry, including birthweight (BW), BW z-score, the sum of skinfolds (SSF), length, and circumferences.

Methods: Among 321 pregnant women from the NICHD Fetal Growth Studies-Singletons cohort, we quantified 28 acylcarnitines using electrospray ionization tandem mass spectrometry in the plasma at gestational weeks 10–14, 15–26, 23–31 and 33–39, accordingly. We firstly applied a latent-class trajectory approach to identify trajectories of acylcarnitines across gestation, and secondly examined associations of individual acylcarnitine and distinct trajectory groups with neonatal anthropometry using weighted linear models with robust standard errors, adjusting for maternal age, race/ethnicity, education, parity, gestational week of blood collection, and pre-pregnancy body mass index.

Results: We identified three distinct trajectory groups of C2, C3 and C4, and two trajectory groups of C5, C10, C5-DC, C8:1, C10:1 and C12, respectively. Newborns of women with nonlinear decline of C12 levels across gestation (5.7%) had significantly smaller BW (−475 g; 95% CI: −942, −6.79 g), BW z-score (−0.39; −0.71, −0.06), and length (−1.38 cm; −2.49, −0.27 cm) than those with persistently stable C12 levels (94.3%). Newborns of women with consistently higher levels of C10 (6.1%) had greater sum of skinfolds (4.91 mm; 0.85, 8.98 mm) than those with lower levels (93.9%) across pregnancy, whereas newborns of women with declining C10:1 levels (12.6%) had larger sum of skinfolds (3.23 mm; 0.19, 6.27 mm) than those with abruptly increasing levels (87.4%).

Conclusions: In conclusion, gestational trajectories of C10, C10:1, and C12 acylcarnitine levels were significantly associated with neonatal anthropometry. Further studies are needed to verify and further explore the potential clinical utility of these findings.

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