Plasma Lecithin-Cholesterol Acyltransferase Activity in Pregnant Women Enrolled in the iLiNS-DYAD Trial in Ghana

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Objectives: The International Lipid-Based Nutrient Supplement (iLiNS) Project developed small-quantity lipid-based nutrient supplements (SQ-LNS) for mothers and their children with the goal of reducing malnutrition. The aim of this secondary outcome analysis is to investigate the effects of SQ-LNS on the activity of plasma lecithin-cholesterol acyltransferase (LCAT), a key enzyme involved in the remodeling of high-density lipoprotein (HDL) particles, which increases their cholesterol carrying capacity.

Methods: Plasma samples from a subset of 197 out of 1320 women at 36-wk gestation enrolled in the iLiNS-DYAD trial in Ghana were analyzed. In the main cohort, women were enrolled during the second trimester ($\leq$ 20 wk gestation) and randomly assigned to receive SQ-LNS, iron and folic acid (IFA), or a multiple micronutrient supplement. Women in this subset received either SQ-LNS or IFA. Plasma LCAT activity was measured using a commercial fluorometric kit and the non-transformed data was compared by Wilcoxon test (mean $\pm$ SD). LCAT activity is expressed as a ratio (390 nm/470 nm), where greater ratio indicates higher enzyme activity. We also explored whether LCAT activity differed by enrollment season (Dry, November–April; Wet, May-October) or was associated with biomarkers of inflammation.

Results: There was no significant difference in LCAT activity between the SQ-LNS and IFA groups (1.44 $\pm$ 0.17 vs. 1.41 $\pm$ 0.14, $P = 0.24$). Women enrolled during the wet season had higher LCAT activity than women enrolled during the dry season (1.47 $\pm$ 0.15 vs. 1.37 $\pm$ 0.14, $P < 0.001$), with no differences between intervention groups stratified by season ($P > 0.05$). LCAT activity was negatively correlated with inflammatory biomarkers α1-acid glycoprotein ($R = -0.19$, $P = 0.007$) and C-reactive protein ($R = -0.28$, $P < 0.001$) measured at 36-wk gestation.

Conclusions: Plasma LCAT activity, as a measure of HDL maturation and cholesterol carrying capacity, is more sensitive to factors mediated by seasonal variation (e.g., infection, inflammation) than by nutrient supplementation in this cohort of women in Ghana. These findings confirm a previously established link between HDL and inflammation.

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