

Assessing the Impact of Socioeconomic Status on Maternal and Cord Serum Omega-3 Polyunsaturated Fatty Acid Levels

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Objectives: Omega-3 (n-3) polyunsaturated fatty acids (PUFAs) are essential in fetal growth and development and have been shown to modulate inflammatory processes throughout the lifespan. Previous studies have demonstrated that individuals with lower socioeconomic status (SES) may be at risk for low intake of n-3 PUFAs, however, no research has compared the concentrations of these nutrients present in maternal and cord serum between markers of SES. The purpose of this study is to assess the relationship between markers of SES and levels of n-3 PUFAs in maternal and cord serum in a group of patients delivering at a Midwest Academic Medical Center.

Methods: An IRB-approved study enrolled mother-infant pairs ($n = 55$) at the time of delivery for collection of maternal and cord serum samples. n-3 PUFA levels quantified included Eicosapentaenoic acid (EPA), Docosahexaenoic acid (DHA), and total n-3 PUFAs.

Markers of SES include private vs public insurance, income $\leq 150\%$ of the poverty line vs $> 150\%$, and college degree earners vs no college degree. The Mann-Whitney U test was used to assess differences in n-3 PUFA levels between SES groups. A $P < 0.05$ was considered statistically significant.

Results: Median gestational age at delivery was 39.3 weeks. Significantly higher nutrient levels were present in college-educated mothers vs less than college-educated mothers in median maternal EPA (9.44 $\mu\text{g/mL}$ vs 5.13 $\mu\text{g/mL}$, $p = 0.010$), cord EPA (1.88 $\mu\text{g/mL}$ vs 1.40 $\mu\text{g/mL}$, $p = 0.011$), cord DHA (37.96 $\mu\text{g/mL}$ vs 32.80 $\mu\text{g/mL}$, $p = 0.014$), and total cord n-3 PUFAs (44.23 $\mu\text{g/mL}$ vs 39.34 $\mu\text{g/mL}$, $p = 0.024$). Median cord EPA levels were significantly higher in those with private insurance compared to public (1.79 $\mu\text{g/mL}$, 1.18 $\mu\text{g/mL}$, $p = 0.022$). Additionally, median cord EPA levels were significantly higher in those $> 150\%$ the poverty line (1.79 $\mu\text{g/mL}$, 1.10 $\mu\text{g/mL}$, $p = 0.030$).

Conclusions: Our findings suggest that individuals with lower SES may be at risk for lower serum levels of n-3 PUFAs in pregnancy, which could increase their susceptibility to adverse birth and pregnancy outcomes. Future studies should focus on replicating these results in a larger, more heterogeneous sample and should consider analyzing additional markers of SES.

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