Background: Observational studies associate higher intakes of n−3 (omega-3) long-chain PUFAs (LCPUFAs) during pregnancy with higher gestation duration and birth size. The results of randomized supplementation trials using various n−3 LCPUFA sources and amounts are mixed.

Objective: We tested the hypothesis that 600 mg/d of the n−3 LCPUFA DHA can increase maternal and newborn DHA status, gestation duration, birth weight, and length. Safety was assessed.

Design: This phase III, double-blind, randomized controlled trial was conducted between January 2006 and October 2011. Women (n = 350) consumed capsules (placebo, DHA) from <20 wk of gestation to birth. Blood (enrollment, birth, and cord) was analyzed for red blood cell (RBC) phospholipid DHA. The statistical analysis was intent-to-treat.

Results: Most of the capsules were consumed (76% placebo; 78% DHA); the mean DHA intake for the treated group was 469 mg/d. In comparison with placebo, DHA supplementation resulted in higher maternal and cord RBC-phospholipid-DHA (2.6%; P < 0.001), longer gestation duration (2.9 d; P = 0.041), and greater birth weight (172 g; P = 0.004), length (0.7 cm; P = 0.022), and head circumference (0.5 cm; P = 0.012). In addition, the DHA group had fewer infants born at <34 wk of gestation (P = 0.025) and shorter hospital stays for infants born preterm (40.8 compared with 8.9 d; P = 0.026) than did the placebo group. No safety concerns were identified.

Conclusions: A supplement of 600 mg DHA/d in the last half of gestation resulted in overall greater gestation duration and infant size. A reduction in early preterm and very-low birth weight could be important clinical and public health outcomes of DHA supplementation. This trial was registered at clinicaltrials.gov as NCT00266825.