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INVITED COMMENTARY

Is Docosahexaenoic Acid Supplementation During Pregnancy and Lactation Beneficial for the Mother-Infant Dyad?

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Fats constitute an important dietary energy source and fatty acids obtained from fat metabolism besides serving as energy sources also play an important role in maintaining normal cellular physiology. Docosahexaenoic acid (DHA), an omega-3 (N-3) long-chain polyunsaturated fatty acid (LCPUFA), has several important roles to play in the human body.

The importance of DHA in maintaining the functions of the brain is evident by the fact that approximately 90% of n-3 PUFAs in the brain are composed of DHA [1]. Placental DHA transport is maximum during the last three months of pregnancy and DHA is rapidly integrated into the brain tissue and retinal photoreceptors. DHA is necessary for neuronal membrane structure, development of the myelin sheath and the retina. It supports neuronal conduction and plays an important role in fetal neurodevelopment [1]. Cells of the immune system also contain membrane-bound LCPUFAs, which have been shown to modulate immune function and inflammation [2]. Later on, in life the importance of DHA lies in maintenance of normal vision, brain and cardiac function [3].

As DHA can be synthesized to some extent from its dietary essential precursor α- linolenic acid (ALA, 18:3n-3), it is not in the true sense an essential fatty acid, yet dietary sources are essential to prevent its deficiency. Omega-3 fatty acids can be found in oily fish, seeds and nuts. The fetus and placenta do not synthesize DHA, therefore, maternal DHA intake and placental transport function are critical for fetal DHA acquisition [1].

There is a growing body of research directed towards the role of DHA supplementation during pregnancy and lactation, in daily doses ranging from 200 to 1000 mg in different studies. Outcomes studied included effect on pregnancy duration and maternal pregnancy complications, as well as on the neonatal and infant outcomes. Studies have shown that DHA supplementation may reduce the incidence of preeclampsia [4]. DHA supplementation has also been shown to reduce the overall risk of preterm births (especially reduction in births at < 34 weeks gestation) and low birth weight, but with a small increase in prolongation of gestation beyond 42 weeks [5, 6]. A possible reduction in the risk of perinatal deaths and neonatal intensive care unit admissions has also been observed [6]. Carlsen et al reported a significantly improved weight, length and head circumference at birth in the antenatal supplemented group versus placebo group [7]. Other studies have also looked at the benefits of antenatal supplementation on the immune functions including reduced rates of allergy and wheezing in infancy with varying results [8, 9].

A number of studies have reported outcomes of antenatal DHA supplementation on long-term neurodevelopmental outcomes. Most studies have not demonstrated consistent long- term benefits in developmental quotient (DQ), cognition, intelligence quotient (IQ), vision, language and behaviour outcomes at 12–24 months of age [6, 10].

In the current issue Khandelwal et al have reported the effect of maternal DHA supplementation during pregnancy and lactation on infant morbidity in a randomized double-blind placebo-controlled trial [11]. The data for this study was collected as part of the DHANI trial to evaluate the impact of the DHA supplementation on infant neurodevelopment which was their primary outcome and has been published previously [10]. For the current study they assessed 11 common morbidities of the pediatric age group and also the need for hospitalization in the two groups. There was no difference in the incidence of common morbidity symptoms among infants in both groups at 1, 6, and 12 months.

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However, they observed a significant protective effect against the group of respiratory symptoms including cough, nasal congestion, and/or difficulty in breathing at 1 month (29.3% vs 34.9%, $P = 0.04$) but this benefit did not persist at 6 and 12 months. They also observed reduced occurrence of 'other' illnesses, such as constipation, anemia, conjunctivitis, jaundice and urinary tract infections at 6 months (1.4% vs 4.8%, $P < 0.005$). Though there was a lesser incidence of morbidity symptoms in the DHA group at 6 months and at 12 months, the difference in incidence was not found to be statistically significant. No difference was observed in the need for hospitalization between the two groups. Imoff-Kunsch et al reported similar findings with a combined measure of cold symptoms being lower in the DHA group at one month with a shorter duration of cough, phlegm, and wheezing. In their study infants in the DHA group spent 14% less time in illness at 3 months (P <0.0001) [12]. At 6 months, infants in the DHA group had significantly shorter duration of fever, nasal secretion, difficulty breathing, rash, and "other illness,", but a longer duration of vomiting [12]. Another placebo-controlled trial reported significantly lesser respiratory symptoms till 18 months of age in ante natal supplemented group of infants born to mothers with atopy but not in infants of non-atopic mothers [13]. Bisgaard et al observed a 7% absolute risk reduction in persistent wheeze or asthma and lower respiratory tract infections in the supplemented group followed till three years of age [8], whereas a meta-analysis by Barebring showed low strength of evidence in the protective benefit against asthma hence termed the evidence inconclusive [9].

The authors have attributed the lack of difference in morbidity outcomes between the two groups to the poor infant young child feeding practices observed by them in their cohort. Additionally, the trial may not have been adequately powered to study this outcome. Overall, the findings of this and other studies on the benefit of antenatal DHA supplementation on infant morbidities are inconsistent, hence larger, adequately powered trials are needed to confirm whether antenatal supplementation of DHA can improve morbidities in infancy and childhood.

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Declarations

Conflict of interest The authors declares that there is no conflicts to disclose.

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