Meta-analysis of LCPUFA supplementation of infant formula and visual acuity
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CRD summary
The review concluded that long-chain polyunsaturated fatty acid supplementation of infant formulas improved infants’ visual acuity up to 12 months of age. The authors’ conclusions reflect the evidence presented only for term infants. The reliability of their conclusion is also uncertain given the unknown quality of the included trials, small sample sizes, and analyses with wide variation.

Authors' objectives
To evaluate the effectiveness of long-chain polyunsaturated fatty acid supplementation of infant formulas for infants’ visual acuity

Searching
PubMed, SCOPUS and PsycINFO were searched up to 2011 for studies published in peer-reviewed journals. Search terms were included. References of included studies and reviews of articles were scanned. There were no language restrictions.

Study selection
Randomised controlled trials (RCTs) that assessed the efficacy of long-chain polyunsaturated fatty acid supplementation of infant formulas on infant visual acuity were eligible for inclusion. The outcome of visual acuity had to be assessed by visual evoked potential or behavioural methods. To be eligible, the supplementation had to start within one month after birth and evaluated at the ages of two, four and/or 12 months. The primary outcome was differences in visual resolution acuity.

In included trials, the dosage of long-chain polyunsaturated fatty acid (such as arachidonic, docosahexaenoic and eicosapentaenoic) varied as well as their sources (such as algae, tuna, fungi).

The authors did not state how many reviewers selected studies for inclusion.

Assessment of study quality
Trial quality was evaluated using Jadad scale.

The authors did not state how many reviewers were involved in quality assessment.

Data extraction
Data were extracted to calculate mean differences and their 95% confidence intervals. Primary trial authors were contacted for additional information. If visual acuity was reported for each eye separately, the average visual acuity of both eyes was calculated.

The authors did not report how many reviewers were involved in data extraction.

Methods of synthesis
A random-effects model was used to pool trials and calculate weighted mean differences and their 95% confidence intervals. All data were converted to the logarithm of the minimum angle of resolution (logMAR) for use in the meta-analysis. The trials were also included in the analysis if the visual acuity assessment occurred within one month of the scheduled time period of two, four and 12 months. Heterogeneity was assessed using $X^2$ and $I^2$.

Sensitivity analysis was conducted to examine whether it was appropriate to use random-effects or fixed-effect models for the meta-analysis. Subgroup analysis was conducted to determine whether term and preterm birth status influenced the outcome result. Meta-regression analyses were conducted to assess the influence of a number of variables.

Publication bias was assessed with funnel plots.
Results of the review
Sixteen trials involving 1,949 infants were included in the review.

Ten trials (852 infants) evaluated visual acuity by using visual evoked potential methods. There was a significant positive effect of long-chain polyunsaturated fatty acid supplementation on infant visual resolution acuity for all three time points (at two months for term infants WMD -0.08, 95% CI -0.14 to -0.03; I²=76%: at four months for term and preterm infants WMD -0.07, 95% CI -0.13 to -0.02; I²=78%: and at 12 months for term infants only WMD -0.11, 95% CI -0.20 to -0.03; I²=92%).

Twelve trials (1,095 infants) evaluated visual acuity by using behavioural methods. A combined analyses of term and preterm infants showed a significant effect of long-chain polyunsaturated fatty acid supplementation on infant visual resolution acuity at the age of two months (WMD -0.08, 95% CI -0.14 to -0.02; I²= 71%) but not at four or 12 months.

The subgroup analyses showed that long-chain polyunsaturated fatty acid supplementation did not have any significant impact on preterm infant visual resolution acuity assessed by both visual evoked potential and behavioural method.

The results of sensitivity and meta-regression analyses were reported in the paper.

There was no evidence of publication bias.

Authors' conclusions
Available evidence suggested that long-chain polyunsaturated fatty acid supplementation of infant formulas improved infants' visual acuity up to 12 months of age.

CRD commentary
The review question and inclusion criteria were clear. Attempts to identify all relevant studies in any language were undertaken by searching databases and checking references. No searches appeared to have been conducted to identify unpublished studies, although the authors could not detect the presence of publication bias affecting the pooled results. The authors did not report how many reviewers were involved in the review process, so reviewer error and bias could not be ruled out.

The authors reported that they used the Jadad scale for quality assessment but details were not reported, so the reliability of the evidence was uncertain. Also trial quality was not used to inform the synthesis of the effectiveness data. Appropriate methods were used for pooling data; sources of heterogeneity were investigated in further analyses.

The authors' conclusions reflect the evidence presented only for term infants. The reliability is also uncertain given the unknown quality of the included trials, small sample sizes, lack of long-term effect, and analyses with wide variation.

Implications of the review for practice and research
Practice: The authors did not report implication for practice.

Research: The authors stated that further trials were needed to assess the efficacy of long-chain polyunsaturated fatty acid supplementation on infants' visual acuity for children older than one year.

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