

Maternal & Infant Nutrition Briefs



November/December 2001

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A research-based newsletter prepared by the University of California for professionals interested in maternal and infant nutrition



To Breastfeed or Not: New Studies in HIV-Positive Mothers

Since 1985 when the first case of HIV transmitted during breastfeeding was reported, the debate has continued about whether or not HIV-positive mothers should breastfeed. The average risk of mother- to-child transmission of HIV while breastfeeding is estimated to be 14%. Certain factors, such as partial breastfeeding, mastitis, nipple disease, and unsafe sex, increase the risk of mother-to- child transmission during breastfeeding. Nevertheless, HIV-positive mothers are often encouraged to breastfeed in developing countries where limited access to clean water and infant formula increases the risk of illness and death among formula-fed babies. The current recommendations (1997/1998) of the WHO and UNICEF acknowledge that if HIV-positive mothers can be ensured uninterrupted access to safely prepared breast milk substitutes, then their babies would be at less risk of illness and death.

Most of the research examining the risk-benefits of breastfeeding infants of HIV-positive women comes from nonrandomized trials. The problem with nonrandomized trials is that the breastfeeding and formula-feeding groups may differ in key factors that are difficult to control for statistically. Recently, the results of a large randomized, clinical trial in Nairobi, Kenya has been able to shed light on the relative risk of formula-feeding vs. breastfeeding among infants of HIV-positive women. The women (n=425) were recruited during pregnancy and randomly assigned to either breastfeed or formula-feed exclusively. To test the "best case scenario", only relatively well-educated women with access to potable water were included in the study. In addition, the study provided counseling and free formula for the first six months. All subjects had free access to clinic care. During the first year, follow-up occurred monthly and during the second year, quarterly.

Over the 24 months of follow-up, the excess risk of HIV transmission due to breastfeeding was 16.2%. Incidence of infant diarrhea, pneumonia, and other infections did not differ significantly between the two groups. Infant mortality rates up to 24 months were also similar among the groups, but HIV infection increased the risk of death by 9-fold. A two-year

follow-up period is probably sufficient to evaluate the risks of formula feeding but may not be long enough to fully capture risk of breastfeeding on future development of HIV. Therefore, under these conditions, the best overall indicator of outcome is the HIV-free survival rate. At 24 months, more formula-fed children (70%) remained alive or HIV-negative than breastfed babies (58%), $p < 0.02$. The authors concluded that, with appropriate education and ensured access to clean water, health care, and formula, formula feeding can be a safe alternative, even in a resource-poor setting.

How relevant are these findings outside of a research setting? Whether breastfeeding or formula-feeding is best for infants of HIV-positive women in any given country depends on many factors. Researchers have estimated that, in other parts of sub-Saharan Africa, formula-feeding could be expected to increase survival of at most 10% of all babies born to HIV-positive mothers, because the "best case scenario" conditions do not exist. To make either infant feeding choice "safer" for these infants would require intensive efforts. In the short term, efforts to make breastfeeding safer may realistically benefit more African mothers and babies than efforts to promote safe replacements for breast milk.

Sources: Mbori-Ngacha D, Nduati R, John G, Reilly M, Richardson B, Mwatha A, Ndinya-Achola J, Bwayo J, Kreiss J. Morbidity and mortality in breastfed and formula-fed infants of HIV-1-infected women. *JAMA* 2001; 286: 2413-2420.
Humphrey J. and Iliff P. Is breast not best? Feeding babies born to HIV-positive mothers: bringing balance to a complex issue. *Nutrition Reviews* 2001; 59: 119-127.

No Effect of Fatty Acid Supplements on Birth Outcomes

Some evidence suggests that intakes of docosahexanoic (DHA) and arachidonic (AA) fatty acids are associated with lower risk of preterm delivery and preeclampsia and higher birth weights. Although the fetus can convert linoleic and linolenic fatty acids to DHA and AA, the fetal and neonatal liver may not be mature enough to make enough of these essential fatty acids from these sources. The purpose of this study was to determine whether supplementing the mother with a source of DHA during pregnancy and lactation affects birth weight, length of gestation, and later infant growth and development.

The study involved a randomized, double-blind, clinical trial among 590 healthy pregnant or nursing mothers in Norway. The mothers took either 10 ml of cod liver oil (DHA source, treatment) or 10 ml of corn oil (linoleic acid source, control), starting at 17-19 weeks of pregnancy and continuing through 3 months after delivery. The main outcomes were birth weight and length of gestation. The researchers also examined birth length and circumference; fatty acid levels in umbilical cord blood, maternal plasma, and breast milk; infant electroencephalography (EEG) at 2 days and 3 months (as a measure of prematurity); and infant novelty preference scores at 6 and 9 months (as a measure of infant intelligence).

At baseline, there were no significant differences in diet, body mass index, smoking or any other variables that could be related to the outcomes of interest. The treatment group had higher plasma and breast milk levels of DHA fatty acids compared to controls but lower levels of AA. No differences were found in any of the main or other secondary outcomes at any time point.

This study is the first randomized, controlled trial to examine the effects of fatty acid supplementation during pregnancy and lactation on infant growth and development. Several reasons could explain their lack of significant differences. First, Norway is a country where

fish consumption-and DHA intake-is already relatively high and where cod liver oil is recommended for infants after 4 weeks of age. Moreover, the sample included healthy women who were not necessarily at high-risk of preterm delivery or low birth weight. In effect, both treatment and controls may have received supplements that affected outcomes positively.

Source: Helland IB, Saugstad OD, Smith L, Saarem K, Solvoll K, Ganes T, and Drevon CA. Similar effects on infants of n-3 and n-6 fatty acids supplementation to pregnant and lactating women. *Pediatrics* 2001; 108 (5): e82 accessed at <http://www.pediatrics.org/cgi/content/full/108/5/e82> on November 26, 2001.

Do Toddlers Need Iron-Fortified Formula?

Breast milk or iron-fortified formula is recommended for the first year of life. After 12 months, many children gradually wean to regular cow's milk. Although iron deficiency is common even in developed countries, very few studies have examined the effects of continuing iron-fortified formula beyond the first 12 months. In four previous studies, all subjects began the feeding trial between 6-9 months, an age when regular cow's milk is not widely recommended. The purpose of this study was to compare iron intake and status of toddlers who were given regular or iron-fortified cow's milk from 12 to 18 months of age.

The study was carried out in Sweden among 54 healthy children, all of whom had been breastfed or given iron-fortified formula during their first year of life. Starting at 12 months, the children were randomly assigned to receive either regular cow's milk (controls) or iron-fortified formula designed for older infants (treatment). Neither the mothers nor the researchers were aware of the group assignment until the end of the study. At 12, 15, and 18 months, the mothers recorded 7-day food diaries for their infants. The researchers drew blood samples from the children at 12 and 18 months to measure a battery of iron status indicators, including hemoglobin; red blood cell mean corpuscular volume; and serum ferritin, iron, transferrin, and transferrin receptor.

The main outcome of interest was the change in iron status from 12 to 18 months. Of the 54 recruited into the study, 36 (20 treatment and 16 controls) completed all phases.

At the beginning of the study, the groups were reportedly similar in iron intake and iron status. At 15 and 18 months, the iron intake of the treatment group was significantly higher than that of the controls (treatment: 10.2-10.9 mg/day vs. controls: 5.2 -5.8 mg/day). Despite a difference in iron intake, change in iron status was similar between the two groups. Unfortunately, due to drop-outs from the study, the sample size was probably too small to pick up any significant differences. Thus, the question remains as to whether or not iron intake from heme and non-heme iron in solid foods is sufficient to prevent iron deficiency in healthy toddlers. Given that iron intakes in the control group were below recommended levels (RDA for 1-3 yr. olds: 7 mg/day), more research on iron status is needed in this age group.

Source: Virtanen MA, Svahn CJE, Viinikka LU, R  ih   NCR, Siimes MA, Axelsson. Iron-fortified and unfortified cow's milk: effects on iron intakes and iron status in young children. *Acta Paediatr* 2001; 90: 724-31.

Pacifier Use: Cause or Coincidence of Early Weaning?

Several observational studies have reported an association between pacifier use and early weaning. Concerned that pacifier use could lead to "nipple confusion", many health providers

encourage mothers to avoid pacifiers. However, in the absence of randomized trials, one cannot rule out that pacifier use is an indicator of early breastfeeding problems or lack of motivation, rather than a factor leading to early weaning. The purpose of this study was to compare the effect of advice to avoid pacifiers on early weaning before 3 months and fussy infant behavior.

The study involved a randomized, controlled trial, which provided 45 minutes of breastfeeding instruction to new mothers in the hospital. Advice was identical to both the control and experimental groups, except that the latter were specifically encouraged not to use pacifiers to calm their infants. At four, six, and nine weeks after delivery, the mothers kept three-day diaries of their infants' episodes of crying, fussing, and using a pacifier. A research assistant, unaware of the group assignment, interviewed each mother about infant feeding practices and pacifier use.

Two-hundred fifty-eight women completed all phases of data collection. The experimental group reported significantly greater pacifier avoidance, compared to controls (38.6% vs. 16%). Frequency of pacifier use at all time points was also lower in the experimental group than in controls. Having received advice to avoid pacifiers was not associated with a longer duration of breastfeeding. However, pacifier use also did not calm infants any better than other methods, such as rocking or carrying the baby. Since the intervention did not completely eliminate pacifier use, the authors then looked at breastfeeding duration among mothers who used pacifiers, compared to those who did not. This observational comparison showed a strong association between pacifier use and early weaning by three months of age (used pacifiers: 25% vs. did not use pacifier: 12.9%).

This study had several limitations, including small sample size and reliance on mother's self-report for infant behavior and pacifier use. However, due to the randomized, controlled design, the findings provide evidence that pacifier use may more an indicator rather than cause of early breastfeeding problems.

Source: Kramer MS, Barr RG, Dagenais S, Yang H, Jones P Ciofani L, Jane F. Pacifier use, early weaning, and cry/fuss behavior. *JAMA* 2001; 286: 322-326.

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