Maternal & Infant Nutrition Briefs

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**When Should Breast-fed Babies Start Solids**?

Although the iron content of breast milk is low, few exclusively breast-fed infants in affluent populations become anemic in the first six months of life. The high bioavailability of iron in breast milk and infant iron reserves help meet the needs of these young babies. Recently, the World Health Assembly and the American Academy of Pediatrics recommended that complementary foods or iron-enriched solids be given from the age of about six months. Delaying solids is particularly important in developing countries to prevent infant diarrhea through contaminated weaning foods. But what about low birth weight babies who may have lower iron reserves at birth? The results from a well-designed, randomized trial in Honduras indicate that a Aone-size-fits-all@ recommendation on the timing of solids may not be adequate to promote health *and* prevent anemia in all breast-fed infants.

The purpose of this study was to examine the effects of nutritious, hygienically prepared solid foods on iron status in breast-fed babies who start solids at either four or six months. The researchers recruited low-income primaparas who delivered healthy, full-term babies weighing more than 2000 gm. All babies were exclusively breast-fed for 16 weeks. After 16 weeks, the babies either continued to nurse exclusively until 26 weeks (EBF) or began to eat commercial iron- and vitamin C-fortified baby foods, provided by the study (early solids). At 26 weeks, staff drew blood samples from the babies for hemoglobin, hematocrit, and plasma ferritin analyses. If their hemoglobin was less than 110 g/L, the babies were given 5 mg of iron/kg/day and re-tested at 9 and 12 months.

Although no differences were seen in total energy intakes, the early solids group had significantly higher mean intakes of iron compared to the EBF babies (4 mg/day vs. 0.2 mg/day, $p < 0.001$). At six months, the early solids group also had significantly higher mean hemoglobin, hematocrit, and plasma ferritin levels compared to the EBF infants (Hgb: 109 vs. 104 g/L; Hct: 0.347 vs. 0.335; and plasma ferritin: 67.3 vs. 48.4 µg/L, $p < 0.05$). Although the percentage of babies with a hemoglobin < 103 gm/L was similar in the two groups, fewer

babies in the early solids group had a hematocrit < 0.33. However, even though the early solids group had better iron status than the EBF infants, at 6 months about 55% of the early solids babies had a hemoglobin less than 110 gm/L, 21% had a hematocrit less than 0.33, and 7.3% had a plasma ferritin level less than 12 µg/L. Babies at greatest risk of anemia and iron deficiency were those whose birth weight was less than 2500 gm. None of the infants weighing > 3000 gm at birth had low plasma ferritin levels at 6 months. Curiously, the percentage of infants with low plasma ferritin levels was less than the percentage with low hemoglobin or hematocrit values. This observation could not be explained by other nutritional deficiencies or infections. Since low plasma ferritin, as an indicator of iron deficiency, is expected to *precede* a drop in hemoglobin levels, the authors suggest that the cutoff value for defining anemia in infants (< 110 gm/L) may be too high. That nearly one-third of the Aanemic@ babies who received iron drops had little or no increase in hemoglobin values is further evidence that the cutoff may indeed be too high.

Assuming plasma ferritin is a good index of iron deficiency, the authors concluded that breast-fed babies weighing more than 3000 gm at birth may not need additional sources of iron before 6 months. However, those with birth weights less than 2500 gm should receive iron drops beginning at 2-3 months of age, since starting iron-enriched solids at four months was not effective in preventing anemia. For breast-fed infants with birth weights between 2500 and 3000 gm, more research is needed to determine the best strategy to prevent anemia and promote health.

**Source:** Dewey KG, RJ Cohen, LL Rivera, and KH Brown. 1998. Effects of age of introduction of complementary foods on iron status of breast-fed infants in Honduras. AJCN 67: 878-84.

**Measuring the Impact of Breastfeeding on Community Health**

Breastfeeding is associated with lower rates of many illnesses in infants. However, some have asserted that much of this association may be due to Aunknown@ differences between nursing and formula-feeding mothers rather than protective properties of breast milk. In a novel approach, some researchers from the University of Arizona analyzed data collected before and after a breastfeeding campaign to estimate the impact on infant morbidity among the Navajo. They reasoned that if breastfeeding is causally linked to lower rates of particular illnesses, rates of those illnesses should be *lower* in breast-fed compared to formula-fed infants *both* before and after a breastfeeding campaign. Furthermore, if the campaign is successful in increasing breastfeeding rates, then infant morbidity rates in the community *as a whole* will be lower after the campaign. Rates of illness within specific feeding groups (i.e., formula-fed, exclusively breast-fed, or mixed feeding) should stay the same over time, unless other events affecting morbidity, like a viral epidemic, occur during one time period only.

The researchers examined medical records of all babies born at the Indian Health Service from 6/1/90 through 5/30/91 before the campaign and from 9/24/91 through 9/24/92 after the campaign. The breastfeeding promotion campaign, which involved culturally-sensitive public service announcements, billboards, provider training, incentives, and family education, significantly increased breastfeeding initiation and rates in the community. At both time points, breastfeeding was linked to lower rates of particular illnesses. The community as a whole experienced lower rates of bronchitis (72% lower), pneumonia (32% lower), and gastroenteritis (15% lower) after the intervention, compared to baseline. The authors attributed these changes to increases in breastfeeding, because rates of illness within specific feeding groups did not change over time. Community rates of croup were 41% higher after the intervention compared to baseline, but the increase was only significant in the formula-fed group. Formula-fed infants also experienced an increased rate of bronchiolitis. These

latter two findings suggest that a viral epidemic hit the community after the intervention. The authors figured that community rates of these illnesses would have been 10-30% higher than observed, if breastfeeding rates had remained the same.

Since rates of illness in this Navajo community may differ from those observed elsewhere, we cannot assume similar outcomes from breastfeeding promotion would occur in other populations. However, this article is important for public health professionals because it outlines a practical approach that might be used to monitor health outcomes following community breastfeeding promotion efforts.

**Source:** Wright, AL, M. Bauer, A. Naylor, E. Sutcliffe, and L. Clark. 1998. Increasing breastfeeding rates to reduce infant illness at the community level. Pediatrics 101 (5): 837-844.

### Diet and Exercise during Lactation

Although eager to lose weight, many breastfeeding women worry that dieting and/or exercise will affect the amount or quality of their breast milk. In previous studies conducted by researchers at UC Davis, short-term dieting decreased milk volumes in mothers who consumed less than 1500 kcal per day. In another study, nursing mothers were randomly assigned to either a 12 week exercise program or a control (nonexercising) group. No differences in maternal weight loss, body composition, milk volume, or milk composition were seen between the two groups. However, the exercising women had increased their energy intakes during the study.

Recently, another study at UC Davis examined the effects of combined dieting and exercise on lactation. Mothers were randomly assigned to one of the following groups: 1) control, at 100% of energy needs; 2) diet only, at 65% of energy needs; and 3) diet plus exercise, at 65% of energy needs. The diet plus exercise group exercised for 60-90 minutes per day during the 11-day intervention. Weight loss differed significantly among the three groups: controls, 0.2 kg; diet only, 1.9 kg; and diet plus exercise, 1.7 kg. In the latter group, all of the weight loss was from fat, compared to two-thirds of the weight loss in the diet only group. There were no differences among the groups in milk volume, milk energy output, nursing frequency, or infant weight gain, but leaner women were more likely than heavier women to experience a drop in milk energy output.

Taken together, these studies suggest that for women who are not underweight initially, moderate rates of weight loss through exercise or dieting may not affect breastfeeding. Although short periods of more rapid weight loss may not be harmful, more research is needed to determine if longer periods of rapid weight loss are safe.

**Source:** Dewey KG. 1998. Effects of maternal calorie restriction and exercise during lactation. J. Nutr. 128: 386S-389S.

### Fast Facts from the WIC Infant Feeding Study

Between August 1994 and December 1995, a nationally representative sample of 900 mothers from the Women, Infants, and Child (WIC) Nutrition Program were interviewed monthly about their infant feeding practices during the first 7 months of these infants= lives. Some findings from this study include the following:

At hospital discharge, only 30% of WIC mothers were exclusively breastfeeding and 15% were using breast- and bottle-feeding. About 16% of all WIC mothers continued breastfeeding for 5 months.

About 33% of mothers who experienced breastfeeding problems in the hospitals received no help from hospital staff.

Breastfeeding mothers who had others care for their babies were twice as likely to give formula, compared to mothers who cared for their own infants. Moreover, WIC infants who were cared for by someone other than their mother were 50% more likely to receive cereal and 30% more likely to receive fruits before 4 months of age.

While less than 10% reported diluting formula, about 25% of WIC mothers had added solids or other liquids to the bottle by 3 months. Receiving advice from WIC on how to feed or prepare formula was not associated with a lower likelihood of adding solids or other liquids to the bottle.

About 21% of WIC infants ate sweets or snack foods (like jam or honey) before they were 4 months old. About 43% of WIC infants drank fruit juice by 4 months of age. Almost 90% drank sweetened drinks (e.g., sodas, Kool-aid) before 12 months of age.

**Source:** United States Department of Agriculture. Food and Nutrition Service. 1997. WIC Infant Feeding Practices Study; Summary of Findings. A copy of the study may be ordered from Pat_McKinney@fcs.usda.gov.

Maternal and Infant Nutrition Briefs is a research-based newsletter prepared by Dr. Lucia Kaiser (*llkaiser@ucdavis.edu*), a Cooperative Extension Specialist in the Department of Nutrition, University of California at Davis. This newsletter is written for health professionals interested in nutrition of mothers and young children.