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



Is Childhood Anemia Linked to Mental Retardation?

In children, iron deficiency anemia is most common during the first two years of life, a time when the brain is still developing. Recent studies have shown that severe anemia can affect both mental and motor development in children. Iron supplements have had mixed results in improving developmental problems related to iron deficiency. Definitive proof that early childhood anemia causes mild or moderate mental retardation will probably never be available because carrying out such studies would be unethical. However, a recent epidemiological study sheds more light on possible long-term consequences of early childhood anemia.

The study involved the linking of birth, nutrition, and school records for 5411 children born in Dade County, Florida during 1979 to 1980. About 69% of the sample was African-American, 23% was Hispanic, and 7% was white. From the birth records, the researchers recorded gender, birth weight, ethnicity, and mother's age and education. The source of nutrition records was the Special Nutrition Program for Women, Infants, and Child (WIC) which provided hemoglobin values for each child upon entry into the program at age 0-5 years. School records indicated whether the child at 10 years of age was judged to be mildly or moderately mentally retarded and thus eligible for special education.

Early childhood anemia increased the risk of later mental retardation 1.28 times for each drop in hemoglobin value (Odds ratio: 1.28; 95% CI: 1.05, 1.60). This effect was seen *after* accounting for the separate effects of birth weight, ethnicity, mother's education and age. In comparison, low maternal education and very low birth weight increased the risk of mental retardation by 11.94 and 4.58 times, respectively. Older mother's age and male gender increased the risk and earlier entry to WIC decreased the risk of later mental deficits.

Since the children in the study were different from the general school population (i.e., study children had more risk factors), the size of the effect might be considerably smaller in a

lower-risk population. As mentioned above, epidemiological studies only suggest, but do not prove, early anemia causes mild or moderate mental retardation. Nevertheless, this study may be useful in estimating the long-term costs of lower achievement and special education associated with early iron deficiency anemia.

Source: Hurtado E.K., Claussen A.H., and K.G. Scott. 1999. Early childhood anemia and mild or moderate mental retardation. *American Journal of Clinical Nutrition* 69: 115-9.

Folate Needs of Breast-Feeding Women

The requirements for folate are greatest during pregnancy and breast-feeding due to its role in the synthesis of protein, DNA, and RNA. While many have studied folate needs during pregnancy, much less is known about the needs for this vitamin in breast-feeding women. The current estimated average requirement (EAR) for folate during lactation is 450 µg/day. This amount is expected to meet the folate needs of at least half the healthy breast-feeding women in the population. To build in a safety margin and meet the needs of 97-98% of the population, the Food and Nutrition Board of the Institute of Medicine has set the recommended daily allowance (RDA) at 500 µg/day for breast-feeding women. Is there any evidence that the folate dietary recommendations for breast-feeding women should be even higher?

A recent study examined the effect of providing 1 mg/day of folic acid to breast-feeding women between 3 to 6 months postpartum. Forty-two healthy women were randomly assigned in a double-blind intervention to receive multivitamins and either 1 mg/day folic acid (supplemented) or 0 mg/day folic acid (control). At 3 and 6 months postpartum, the researchers collected breast milk and blood samples, estimated dietary folate intakes, and measured breast milk intake and infant growth.

Average dietary intake of folate in these women, not counting the supplement, was 380 µg/day folate and did not differ among the groups. Therefore, the supplemented women had intakes of about 1400 vs. 400 µg/day of folate in the controls. At 6 months postpartum, RBC folate and hemoglobin values were higher in the supplemented women than in the controls ($p < 0.05$, $p < 0.02$, respectively). Plasma homocysteine levels also increased over time in the control women. When elevated, plasma homocysteine, may be an indicator of low folate status. Despite the rise in plasma homocysteine, all controls had values below the cutoff for abnormally high values (i.e., $< 15 \mu\text{mol/L}$). Milk folate levels dropped between 3 to 6 months in the control women only ($p < 0.02$). However, the control women had higher milk folate levels at the start of the study, compared to the other group, and a drop in levels might not be unusual. Infant growth did not differ between the groups, indicating that breast-feeding was going well.

Based on their results, the researchers estimate the average folate requirement during lactation (EAR) to be 455 µg/day, virtually the same as that estimated by the Food and Nutrition Board. Unfortunately, their study involved only two levels of folate and two time points for data collection. Nevertheless, the current RDA should meet the needs of most healthy breast-feeding mothers, with the possible exception of women nursing more than one infant.

Source: Mackey A.D. and Picciano M.F. 1999. Maternal folate status during extended lactation and the effect of supplemental folic acid. *AJCN*. 69: 285-92

Breast-Feeding: How Much is Enough to Keep Baby Healthy?

Many studies have shown that breast-feeding can protect babies from gastrointestinal and respiratory illnesses. However, these studies are often plagued by various methodological problems, including failure to distinguish between full- and partial breast-feeding. Perhaps as a result, many physicians doubt whether breast-feeding in the U.S. confers the same health benefits as it does in developing countries. Using data from the 1988 National Maternal and Infant Health Survey, some researchers examined the questions of how much breast-feeding is needed to see a protective health effect and whether these health benefits are found at all income levels.

After excluding very low birth weight babies from the sample, the authors had 7092 cases available to examine these questions. In the survey, mothers recalled how many times a day they provided breast milk, formula, cow's milk, and solid foods to their babies during each of the first 6 months of life. Each month, breast-feeding was then defined as follows: 1) full (all breast milk); 2) most (breast > other); 3) equal (breast = other); 4) less (breast < other); and 5) none. The outcomes included the number of sick baby medical visits and months with diarrhea, cough or wheeze, ear infection, runny nose or cold, fever, vomiting, or pneumonia. In the data analysis, the authors controlled for the effects of mother's age, race, Hispanic ethnicity, education, poverty status, infant birth weight, siblings, day care, smoking, household crowding, and month of life.

Full breast-feeding reduced the risk of diarrhea, cough or wheeze, and vomiting in all cases ($p < 0.05$). In infants without siblings only, full breast-feeding also reduced risk of ear infections, runny nose or cold, and fevers. Lower amounts of breast milk (most or equal) had significant but more modest health effects. However, minimal breast-feeding did not reduce the risk of any illness nor the number of sick baby visits to the doctor. Finally, the health effects of breast-feeding did not differ by income level.

For some time, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) has defined breast-feeding as at least one feeding per day, enabling the program to serve many women as partial breast-feeders. The finding that minimal breast-feeding is not associated with measurable health benefits makes the "once a day definition" harder to justify on scientific grounds. The data from this study may also be useful to others who are interested in establishing the cost-benefits of breast-feeding promotion efforts and convincing providers that breast-feeding is the healthiest option for upper, as well as lower, income families.

Source: Raisler J., Alexander C., and O'Campo, P. 1999. Breast-feeding and infant health: a dose response relationship. *Am. J. Public Health.* 89: 25-30.

Juice and Child Growth: An Update

The November/December 1997 issue of *Maternal and Infant Nutrition Briefs* included a review of a study by Dennison and coworkers who reported an relationship between excessive juice intake (i.e., more than 12 ounces a day) and short stature and overweight in preschool children. Findings from that study were readily communicated to the public via NBC's Today Show and popular magazines. More recently, Skinner and colleagues tried to replicate these findings but did not find an association between juice intake and either short stature or overweight. Since the incidence of overweight is increasing in the preschool population, the

question of whether excessive juice is a contributing factor deserves more attention.

There are at least two reasons why these studies may have produced conflicting results. First, the Dennison study examined the relationship of juice intake to child growth in two- and five-year olds. The Skinner study was only able to examine the relationship in two-year olds. Since the effect of excessive juice on body mass index was strongest in the older group of children, it is not surprising that the Skinner study found no significant effect. Neither study discussed how many children would be needed in a study to demonstrate an effect. However, the Dennison study had a larger sample size (n=160) compared to the Skinner study (n=105). Data from the Skinner study reveal a marginal positive effect of excessive juice on body mass index \geq the 90 th percentile ($p < 0.08$). With a larger sample size and older children in the study, an association between juice and child body mass index might have been seen.

The case on juice intake and child growth remains far from closed at this point. Both of these studies have looked at this relationship primarily in white preschool children. Furthermore, even the Dennison study only provides evidence that an association exists but does not establish a cause and effect relationship. Does excessive juice cause overweight or could juice intake only be a indicator of frequent snacking, which might not be captured as well by dietary assessment methods? Do parents begin to push juice more when they perceive their children to be overweight? Clearly, more research is needed, particularly in ethnically diverse populations where feeding strategies and meal patterns may differ from those of the general population

Sources: Dennison B.A., Rockwell H.L., Baker S.L. 1997. Excess fruit juice consumption by preschool-aged children is associated with short stature and obesity. *Pediatrics* 99 (1): 15-22.

Skinner J.D., Carruth B.R., Moran J., Houck K., Coletta F. 1999. Fruit juice intake is not related to children's growth. *Pediatrics*. 103 (1): 58-64

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