

Maternal & Infant Nutrition Briefs



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Getting Enough Folate through Diet and Supplements

Does the Timing of Solid Foods Shorten the Duration of Amenorrhea?

Are Diets Low in Saturated Fat and Cholesterol Safe for Young Children?

Breast-feeding and Changes in Bone Mineral Density

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



Getting Enough Folate through Diet and Supplements

Previous research shows that maintaining red cell folate levels above 906 nmol/L (400 ng/mL) may provide the greatest protection against folate-related neural tube defects (NTDs), including spina bifida and anencephaly. In the U.S., the current recommendation is that all women of child-bearing years consume at least 400 µg of folic acid per day. However, the bioavailability of natural folates and folic acid from supplements and fortified foods differs. Therefore, the purpose of this study was to identify the effects of different sources of folate and other factors on levels of red cell folate.

The data used for this analysis came from the Diana Project, which was a prospective study of preconceptual and prenatal risks related to birth outcomes. Women between 22-35 years were eligible for the study if they were trying to become pregnant and had no history of chronic disease or infertility. Blood samples were analyzed for red cell folate, serum ferritin and zinc, and hemoglobin. A modified Willett food frequency questionnaire was used to estimate dietary intake at the time of the blood draw. Data on vitamin and mineral use, weight, smoking habits, and socioeconomic status were also collected.

Although the women were primarily well-educated and middle-income, only 25% had red cell folate levels above 906 nmol/L (400 ng/mL). Moreover, these levels were mostly found in women who took folic acid supplements. Folate intakes of at least 500 µg per day from foods and folic-acid fortified cereals appear to be needed to achieve red cell folate levels above 906 nmol/L in women not taking folic acid supplements. To provide that level of dietary folate, at least five servings of fruits and vegetables and one serving of a highly fortified cereal like Product 19 or Total would be needed daily. The authors also found that vitamin C supplements have a positive effect on red cell folate levels, possibly by protecting tetrahydrofolate from oxidation. However, evidence of an inverse relationship between serum zinc and red cell folate was found in women taking folic acid supplements, suggesting that

folic acid supplements may interfere with zinc absorption.

The authors concluded that red cell folate levels protective against NTDs can be achieved by folic acid supplements of 400 µg/day or by ample consumption of fruits, vegetables and cereals highly fortified with folic acid. However, getting enough folate from diet alone to prevent NTDs, even after grain fortification is fully implemented, may be harder to do than previously thought.

Source: Brown, J. E., D. R. Jacobs, T. J. Hartman, G. M. Barosso, J. S. Stang, M. D. Gross, M.A. Zeuske. (1997) Predictors of red cell folate level in women attempting pregnancy JAMA 277:548-552.

Does the Timing of Solid Foods Shorten the Duration of Amenorrhea?

Breast-feeding is a major factor influencing the duration of postpartum infertility. In developing countries, the Lactational Amenorrhea Method (LAM) is an important strategy for birth spacing. Although the exact mechanism is not fully known, the frequency and duration of infant suckling appear to play a role. When babies start solid foods at four months, they may nurse less often, which could increase the chances that their mothers would resume ovulation and menstruation within the first six months postpartum. However, some mothers may start their babies early on solid food or provide larger amounts of solids because their milk production is already low. In this case, shorter duration of amenorrhea could be triggered by factors other than early introduction to solid foods. Therefore, a randomized study was carried out in Honduras to systematically examine the effects of introducing solid foods on the duration of amenorrhea in nursing mothers.

Mothers and infants were recruited from two public hospitals in Honduras. To be eligible, mothers had to be healthy, low-income primiparas, who intended to breast-feed their infants for at least six months. Staff visited the mothers weekly during the first 16 weeks to provide breast-feeding support. At 16 weeks, the mothers and babies were randomly assigned to one of three groups: 1) exclusive breast-feeding until 26 wks postpartum (control); 2) introduction of solids at four months with ad libitum breast-feeding (SF); or 3) introduction of solids at four months, while maintaining breast-feeding at same level as before the intervention (SF-M). To avoid problems of unhygienically prepared baby foods, the mothers fed their babies commercial infant foods provided by the study. At 16, 21, and 26 weeks, the mothers spent three days with their babies at a central unit where breast milk intake and the frequency and duration of breast-feeding were recorded. Mothers also kept breast-feeding records at home and provided data on menstruation and contraceptive use.

Of the 141 mothers who completed the intervention, 25 (17.7%) began menstruating before 16 weeks postpartum. These women and others who resumed menstruation by 18 weeks were excluded from the study, because early menstruation in this group could not be due to the intervention. Among the rest of the women, the percentage remaining amenorrheic at six months postpartum was significantly lower in the SF group (64.5%) compared to the control and SF-M groups combined (84.7%) ($p < .02$). The only factor significantly related to the duration of lactational amenorrhea was total time spent breast-feeding per day at 21 weeks ($p = 0.017$). Energy intake from solid foods had a small, negative effect on this factor ($p = 0.06$).

Outside of the research world, getting mothers to maintain breast-feeding at the same level while starting their babies on solid foods is probably very difficult to do. Therefore, in

developing countries where large quantities of complementary food are given before six months of age, promotion of exclusive breast-feeding and delaying solids for six months will probably increase the success of the Lactational Amenorrhea Method and the intervals between births.

Source: Dewey, K.G., R. J. Cohen, L. L. Rivera, J. Canahuati, and K. H. Brown. (1997) Effects of age at introduction of complementary foods to breast-fed infants on duration of lactational amenorrhea. *AJCN* 65:1403-1409.

Are Diets Low in Saturated Fat and Cholesterol Safe for Young Children?

Fat is an essential component of a young child's diet. In addition to providing energy for growth, fatty acids form part of the cell membranes and are important in the development of the central nervous system. Deficiencies of fat-soluble vitamins and minerals can also occur when fat is very restricted. Cholesterol and essential fatty acids are needed to make hormones and other vital substances such as prostaglandins. Currently, the American Academy of Pediatrics Committee on Nutrition does not recommend diets containing < 30% energy from fat for children under two years of age.

Yet, some are considering low-fat diets for young children to reduce risk of later developing chronic diseases, mainly coronary heart disease (CHD). However, there are no long-term prospective studies that establish the link between hypercholesterolemia in children and risk of CHD in adulthood. On the other hand, unsupervised low-fat diets have resulted in growth failure in young children. Much less is known about the safety of changing the type of fat offered to young children. The aim of the Special Turku Coronary Risk Factor Intervention Project (STRIP) in Finland was to examine the effects on growth and cholesterol levels of a diet low in saturated fat and cholesterol in young children.

In the STRIP, 1062 infants were randomly assigned at 7 months of age to either the intervention (n=540) or control (n=522) groups. Pediatricians, nutritionists, and nurses provided intensive education to the parents of the intervention infants at 7, 8, 13, 18, 24, 30, and 36 months of age. Breast milk or formula was recommended until 12 months of age in both groups, but after 12 months, the intervention children were switched to skim milk, while the controls received 1.9% fat cow's milk. To keep the amount of fat the same as in the control diet, mothers were instructed to add 2 to 3 teaspoons of vegetable oil or soft margarine to their child's diet. Lean meats, plenty of vegetables, low-fat cheeses, and nondairy ice cream were provided. Follow-up data collection included serum cholesterol levels, weight, length or height, and dietary intakes (from 3 or 4 day food records). The average duration of breast-feeding was reputedly similar for both groups, but detailed information on breast milk intake was not collected.

Despite efforts to keep the amount of calories and fat the same in both diets, the intervention children had significantly lower energy and fat intakes (kcal/kg and % kcal as fat) than controls at 13, 24, and 36 months. The P:S ratio of the diets were higher and serum cholesterol levels, lower in the intervention group compared to controls. Initial weights and heights of the children were similar, and no differences in growth were observed over time. However, the fat intakes of the comparison group in this study also tended to be relatively low and did not exceed 30% of the kcal as fat until after 24 months of age. Before concluding that modified fat and cholesterol diets are safe for infants and toddlers, the potential effects on cognitive development must also be examined. Furthermore, recommending such diets without providing individual nutritional counseling and monitoring could result in growth

failure.

Source: Niinikoski, H, H. Lapinleimu, J. Viikari, T. Rönnemaa, E. Jokinen., R.Seppänen, P. Terho, J. Tuominen, I.Välimäki, and O. Simell . (1997) Growth until 3 years of age in a prospective, randomized trial of a diet with reduced saturated fat and cholesterol. *Pediatrics* 99(5): 687-694.

Breast-feeding and Changes in Bone Mineral Density

At 2 weeks postpartum, a healthy mother supplies an average of 200 mg of calcium per day via breast milk to her baby. How does the mother manage to provide that amount of calcium to meet her baby's needs? A study published in the *American Journal of Clinical Nutrition* is one of the first to relate longitudinal data on dietary intake, breast milk output, and biochemical markers of bone turnover to changes in bone mineral density through lactation and weaning.

In a group of 26 healthy, fully breast-feeding women, average dietary calcium intakes exceeded 100% of the RDA (1200 mg) at 0.5, 3, 5, and 7 months postpartum. These women probably absorbed about 100 mg of calcium per day more than the nonlactating postpartum women in the study. Between 2 wks and 3 months, bone mineral density in the lumbar spine declined about 4% in the breast-feeding women only. Release of calcium from lumbar spine would make an additional 130 mg of calcium per day available to the infant. Thus, a combination of generous dietary calcium intakes and mobilization of calcium from the mother's skeleton appear to be involved in meeting the demands for calcium in breast milk. In this study, the average bone mineral density of the mothers after weaning their babies was not significantly different from the baseline value, suggesting bone mineral loss is temporary. Parity or repeated cycles of pregnancy and lactation appear to affect adversely the mother's bone mineral density but a generous ratio of calcium to protein in the diet can spare bone loss to some extent.

Source: Krebs, N. CJ Reidinger, AD Robertson, and M. Brenner. (1997) Bone mineral density changes during lactation: maternal, dietary, and biochemical correlates. *AJCN*: 65:1738-1746.

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