

## Maternal & Infant Nutrition Briefs

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**March/April 2004**

**Does Exercise Reduce the Risk of Gestational Diabetes?**

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



### **Does Exercise Reduce the Risk of Gestational Diabetes?**

Previous studies have shown that physical activity, along with a low-fat diet and weight loss, can reduce the risk of type 2 diabetes in high-risk populations. Exercise stimulates the muscle to be more sensitive to insulin, allowing glucose to enter the cells. Exercise before and/or during pregnancy might also reduce the risk of gestational diabetes, which occurs in 2-5% of all pregnancies and is also characterized by insulin resistance. The purpose of this study is to examine the effect of recreational physical activity on gestational diabetes.

The study was carried out among 909 pregnant women, served through several clinics in Tacoma and Seattle, Washington from 1996-2000. Most of the women were white, middle-class, and pregnant for the first time. The researchers interviewed the women about the type, frequency, and intensity of their recreational physical activity before pregnancy, as well as their activity during the previous 7 days. All women were interviewed in their first trimester and underwent routine screening with a 1 hr. 50 g glucose tolerance test. Women with high plasma glucose levels also underwent the 3 hr. oral glucose tolerance test (OGTT). The effects of exercise on the occurrence of gestational diabetes, as defined by an abnormal OGTT, was examined controlling for mother's age, race, parity, and weight before pregnancy.

In this study, 4.6% of the women developed gestational diabetes. The median number of hours a week spent in recreational activity before pregnancy was 4.2 hours. Sixty-three percent of the women reported being active before and during pregnancy, whereas 25% ceased their recreational activity after becoming pregnant. Inactive women were more likely to be overweight than active women. Controlling for the mother's pre-pregnancy weight and other variables, physical activity before and during pregnancy reduced the risk of gestational diabetes by 69%. Women who

were only active before pregnancy were 60% less likely to develop gestational diabetes. Activity only during pregnancy was not associated with a significantly lower risk of diabetes but only 4% of the women fell into that category. Since the women were not actually randomly assigned to different exercise groups, some other unmeasured factor, such as diet, may have contributed to a lower risk of diabetes. Also, the study needs to be repeated in a more ethnically diverse population.

*Conclusions and Implications: Physical activity, especially before pregnancy, may decrease the risk of developing gestational diabetes, but more research is needed in diverse populations.*

**Source:** Dempsey JC, Sorenson TK, Williams MA, Lee IM, Miller RS, Dashow EE, and Luthy DA. Prospective study of gestational diabetes mellitus risk in relation to maternal recreational physical activity before and during pregnancy. *Am J Epidemiol* 159(7): 663-670.

### **Effects of Early vs. Late Introduction to Solids on Iron Status**

The 2004 edition of the American Academy of Pediatrics (AAP) Pediatric Handbook states that, in developed countries, complementary foods may be introduced between 4 to 6 months when the infant is developmentally ready. However, AAP supports the World Health Organization's recommendation of exclusive breast-feeding for 6 months in the developing world. Research in Honduras has shown that even among small-for-gestational-age (SGA) infants, early introduction of hygienically-prepared, solid foods at 4 months is of no particular advantage for their growth. The findings in this paper relate to the effects of the timing of solid foods on iron and other micronutrient status from the same population.

The study involved a randomized intervention in Honduras, where exclusively breastfed SGA were introduced to high-quality commercial baby foods at either 4 or 6 months of age. These baby foods, provided free-of-charge to the mothers, included iron-fortified rice cereal, chicken, fruit, and vegetables. Research staff visited the subjects weekly over the 2-month period to monitor infant growth and illness. Staff also collected blood samples from the infants at 2, 4, and 6 months of age to be analyzed for hemoglobin; hematocrit; % transferrin saturation; red blood cell folate; and plasma zinc, B12, folate, and vitamin A. Anemic infants were given iron drops for 2 months and re-tested.

At 2 months of age, almost half of the population (47%) was anemic, but the proportion given iron drops did not vary among the early and late solids intervention groups. Among exclusively breastfed infants who were not given iron drops from 4 to 6 months, introduction to solid foods at 4 months significantly reduced the incidence of anemia at 6 months, compared to the other group (early solids: 2% vs. late solids 21%,  $p < 0.01$ ). Among exclusively breastfed infants who were given iron drops, hemoglobin increased more in the late solids, compared to the early solids group ( $p < 0.02$ ), but the incidence of anemia was the same in both groups (about 20%). The two groups did not vary for any of the other nutrients, but unfortunately many of the blood samples were lost when a freezer containing them was stolen during the study.

*Conclusion and Implications: Iron supplements starting at 2 months are important for small-for-gestational age, exclusively breastfed babies and may be more effective at maintaining iron status than introducing iron-rich solid foods at 4 months.*

**Source:** Dewey KG, Cohen RJ, Brown KH. 2004. Exclusive breast-feeding for 6 months with iron supplementation maintains adequate micronutrient status among term, low-birth weight, breast-fed infants in Honduras. *J Nutr* 134: 1091-1098.

### **Development of Food Preferences in Infancy**

Are there particular ages when infants are more likely to form likes and dislikes for certain flavors? In cross-sectional studies, infants less than 4 months are more likely than older infants to accept the bitter, sour-tasting hydrolyzate formulas. Using a randomized, experimental design, the authors of this study examined whether age of introduction influences acceptance of new flavors among infants.

The study, carried out among exclusively formula-fed infants, specifically looked at infant acceptance of different formulas. The babies were randomly assigned to one of four groups at one month of age. The control group was fed Enfamil for the entire 7 months (n=14). A second group consumed only Nutramigen for the same period (n=12). The next two groups were somewhat more complicated. One consumed Nutramigen for months 1-3 and then switched to Enfamil for months 4-7 (n=15). The other consumed Enfamil for months 1-2, switched to Nutramigen for months 3-5, and then returned to Enfamil for the months 6-7 (n=12). The authors did not explain why they chose that particular pattern for the last group. At 7 months of age, all infants were videotaped during 3 sessions when they were fed either Enfamil, Nutramigen, or a completely different, novel formula, Alimentum. The researchers recorded amounts of formula consumed, length of feed, frequency of negative infant facial gestures, and the mothers' ratings of infant acceptance. Mothers and the research staff were both unaware of which formula was offered to the infant at each session.

Compared to the controls, the groups given Nutramigen for all or part of the 7 months showed the greatest acceptance (intake, length of feed) and least rejection (negative facial gestures, mother's rating) of Nutramigen and the novel formula Alimentum. As one might expect, acceptance was greatest among the babies fed Nutramigen for the entire 7 months. There was no difference between the groups given Nutramigen during the first 3 months of life or during months 3-5. However, since these groups overlapped at 3 months, the study design may have missed the sensitive period, if such a period does exist.

*Conclusions and Implications: Although this study did not provide evidence for a sensitive period at 3 months of life, it did confirm that previous exposure enhances later acceptance in infants. Since formula, unlike breast milk, is monotonous in flavor, research is needed on how the timing of introduction to solids in formula-fed infants influences later food preferences during childhood.*

**Source:** Mennella JA, Griffin CE, Beauchamp GK. Flavor programming during infancy. *Pediatrics* 113 (4); 840-845.

### **Are Live Probiotic Bacteria Safe for Infants?**

Different cultures have consumed nonpathogenic bacteria, including bifidobacteria and lactobacilli species, for centuries in yogurt and other fermented dairy products. Increased consumption of foods containing these live bacteria, referred to as probiotic agents, has occurred more recently in the US, often for a variety of health

reasons. For example, breakdown of lactose by the bacteria in some dairy products eases problems associated with lactose intolerance. A number of bifidobacterial species are able to survive digestion and at least temporarily colonize the intestinal tract of infants. Since bifidobacteria form the greater part of flora in breastfed infants, consumption of probiotic bacteria has generally been regarded as safe for children, although not thoroughly examined. A recent double-blind, randomized controlled trial in infants and toddlers was designed to examine the effects of long-term consumption of probiotic bacteria.

With their parent's consent, healthy infants and children (3 through 24 months of age) were randomly assigned to receive at least 240 ml daily of either a control, standard formula (placebo) or a formula supplemented with either a low or high dose of *Bifidobacteria lacti* and *Streptococcus thermophilus*. All infants and children attended day care centers in Baltimore, where the research staff were able to measure and weigh them weekly and monitor their intake of the formula. The infants and children remained in the study until they left the day care center or weaned themselves. The average length of time receiving the formula was 210 days. Staff also phoned the parents every week to ask about illnesses, gastrointestinal problems, and general diet of the infants and children.

There were no differences in age, gender, weight or length of the groups at the start of the study. The supplemented formulas were well-accepted and did not result in any differences in growth, incidence of diarrhea, or episodes of vomiting and fever. The supplemented groups were significantly less likely to be colicky or irritable ( $p < .001$ ) and required antibiotics less often than the control group ( $p < 0.001$ ). One limitation of the study was that some infants were also breast-fed, but the influence of human milk on any of the results was not examined. Also, the range of ages at entry in the study was wide (3-24 months), and length of follow-up in the study, variable. Given the variability in feeding patterns, age, and length in the study, the authors should have commented on whether a sample size of 118 was large enough to detect problems in any subgroup.

*Conclusions and Implications: This double-blind, randomized, controlled, study is the first to examine the safety of long-term exposure to probiotic bacteria in healthy infants and young children. No evidence of intolerance or adverse effect on health or growth was reported, but more research may be needed in diverse groups.*

**Source:** Savedra JM, Abi-Hanna A, Moore N, Yolken RH. Long-term consumption of infant formulas, containing live probiotic bacteria: tolerance and safety. *Am J Clin Nutr.* 79; 261-267.

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