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Exclusive Breast-feeding Reduces Childhood Obesity Risk

Breast-feeding is being promoted as a promising strategy to reduce the risk of childhood obesity. Some questions have been raised about the effects of breast-feeding on growth of infants born to mothers with diabetes. A large study of the children born to women in the Nurse's Health Study was able to examine the effects of exclusive breast-feeding and duration of breast-feeding overall on the odds of being overweight during youth, comparing the effects among mothers with or without diabetes.

The authors combined data collected from the mothers with a questionnaire mailed to their children, who were 9-14 years old at the time of the study (n=15, 253). From the mothers, information was available on pre-existing or gestational diabetes; maternal self-reported weight status before and after pregnancy; infant feeding practices; and the child's medical history. Breast-feeding in the first six months of life was defined as: breast milk only; more breast milk than formula; equal breast milk and formula; mostly formula; or only formula. Duration of breastfeeding included: 0, < 1, 1-3, 4-6, 7-9, and >9 months. From the children, the authors obtained data on current self-reported weight and height; physical activity; and dietary intake using a food frequency questionnaire.

For all children combined, breastfeeding was associated with reduced prevalence of overweight. Compared to the formula-fed only group, exclusively breast-fed infants were significantly less likely to be overweight in youth (Odds ratio: 0.66, CI 0.53-0.82). The results were similar among women who had been normal weight or overweight or had diabetes during pregnancy. The effect of "more breast milk than formula" was also somewhat protective. Generally, longer duration of breast-feeding also had a protective effect. Breast-feeding for less than one month, compared to none at all, unexpectedly was associated the highest odds of overweight (Odds Ratio: 1.36, CI 1.02-1.82). This association needs to be confirmed in future studies, with more careful attention to the impact of early feeding decisions on later infant growth.

Implications and conclusions: Exclusive breastfeeding and longer duration of breastfeeding are associated with lower prevalence of overweight in youth. The findings were similar among mothers who were normal or overweight or had diabetes during their pregnancies.

Source: Mayer Davis EJ, Rifas-Shiman SL, Zhou L, Hu FB, Colditz GA, Gillman MW. Breast-feeding and risk for childhood obesity. Diabetes Care 2006; 29: 2231-2237

No Effect of Zinc Supplements on Growth of Breastfed Infants

In undernourished populations, zinc supplements have a beneficial effect on growth of breastfed infants. Although the amount of zinc consumed by older breastfed infants in the U.S appears marginal, it is not clear whether zinc supplements are needed in this relatively affluent population. The purpose of this study was to determine whether zinc supplements have an effect on growth, development, or illness patterns of healthy breastfed infants in a U.S. population.

The study involved a double-blind, randomized, controlled trial, where infants were given either 5 mg/day of zinc (n=33) or a placebo (n=37) from 4 to 10 months of age. Each month, the researchers weighed and measured the infants. The mothers kept a detailed one-day food record each month of all food and beverages the infants consumed other than breast milk. The mothers also recorded symptoms of illness on monthly calendars and responded to weekly phone interviews. One of the researchers did a monthly assessment of infant motor development using the Alberta Infant Motor Scale. Care was taken to ensure that the researchers did not know the group assignments of the infants, while data collection was underway.

The zinc-supplemented and control infants were similar in family characteristics, birth weight, early infant growth (0-4 mos.), and age at introduction to solids. Dietary intake from complementary foods (not including the supplements) was similar in energy, protein, vitamins, and minerals. Compliance was good, with 93% of the zinc group and 88% of the controls receiving their drops daily. In this well-nourished population, zinc supplementation had no effect on infant growth (weight or length gains) from 4 to 10 months. No differences were observed in gross motor development or illness patterns.

Conclusions and Implications: Since dietary supplementation had no effect, usual zinc intake of these breastfed infants appears to be adequate. Differences in growth between healthy, normal breastfed and formula-fed infants may not be due to zinc status.

Source: Heinig MJ, Brown KH, Lönnerdal B, Dewey KG. Zinc supplementation does not affect growth, morbidity, or motor development of US term breastfed infants at 4-10 mo of age. Am J Clin Nutr 2006; 84: 594-601.

Glycemic Index and Pregnancy Outcomes

During late pregnancy, insulin resistance and glucose intolerance increase, allowing more glucose to reach the fetus. In some women who probably have an underlying metabolic problem, these changes result in gestational diabetes. Little is known about the role of the type of carbohydrate in reducing risk of gestational diabetes and improving pregnancy outcomes. A couple of terms are useful in studying the effects of carbohydrate on levels of sugar in the blood. *Glycemic index* is a relative measure of the effect of carbohydrate from different foods on the rise in blood sugar after a test meal. Foods with a high glycemic index, such as white potatoes or white bread, produce a greater response in blood sugar than foods with a low glycemic index, like beans or yogurt. *Glycemic load* reflects both the type (glycemic index) and amount of carbohydrate in the food or diet.

Two recent studies examined the effects of glycemic index and/or glycemic load on pregnancy complications and outcomes.

A prospective study of women in the Nurse's Health Study looked at the effect of dietary fiber and glycemic load on the risk of developing gestational diabetes. Excluding women with diabetes, heart disease, or cancer at the start of the study, the authors selected subjects who completed a food frequency questionnaire in 1991 and had at least one pregnancy lasting 6 or more months between 1992-1998. A total of 13,110 women met these criteria. In addition to dietary intake variables, other data included self-reported weight, height, and history of gestational diabetes occurring between 1992 -1998. Gestational diabetes occurred in 5.7% of the pregnancies. Total dietary fiber, cereal fiber, and fruit fiber all significantly decreased the risk of diabetes. After controlling for other dietary variables, glycemic load significantly increased risk of diabetes. The dietary patterns, collected before pregnancy, presumably continued into pregnancy but that was not verified in the study.

An intervention with a low-glycemic index (GI) diet was carried out among 70 pregnant women in Australia. At 12 to 16 weeks of pregnancy, women were alternately assigned to either a low GI diet (n=35) or a moderate-to-high GI diet (n=35). Both diets provided 30% of the food energy as fat and 55% as carbohydrate, with only the type of carbohydrate varying. To increase compliance, the researchers gave the women each month some key foods (kinds were not mentioned). A dietitian guided the women on the diets, meeting with them 5 times during the study. The researchers collected data on prenatal diet and weight gain; birth weight; and gestational age. Even though there was no difference in prenatal weight gain, women on the high GI diet gave birth to significantly heavier babies than those on the low GI diet (3644 g vs 3408 g, p =0.051). Gestational age and prevalence of small-for-gestational age did not differ among the two groups. However, there are a number of study limitations that make these findings difficult to interpret. For example, the authors do not clearly state how initial differences in the two groups were handled in the analysis. Women on the high GI were heavier at baseline and consumed diets with a slightly higher GI than women assigned to the low GI diet.

Conclusions and Implications: Interest in the type and amount of carbohydrate consumed during pregnancy is growing. These two studies suggest that diets higher in fiber and with a lower glycemic load may be beneficial in reducing risk of gestational diabetes and improving birth outcomes. Limitations in the current research should be addressed in future well-designed clinical trials.

Source: Zhang C. Liu A, Solomon CG, Hu FB. Dietary fiber intake, dietary glycemic load, and the risk for gestational diabetes mellitus. Diabetes Care 2006; 29: 2223-2230.
Moses RG, Luebcke M, Davis WS, Coleman KJ, Apsell LC, Petocz P, and Brand-Miller JC. Effect of a low-glycemic index diet during pregnancy on obstetric outcomes. AJCN 2006; 84: 807-812.

Should Pregnant Women Take Fish Oil Supplements?

In communities where people eat fish often, certain pregnancy outcomes, including birth weight and duration of pregnancy, are better than in populations consuming less fish. Fish oil is rich in omega-3 fatty acids, which play a role in blood pressure, the immune response, and many other body functions. These observations have led researchers to ask whether the supplements of fish oil and other omega 3-rich oils might have a beneficial effect on preventing pre-eclampsia, miscarriages, preterm birth, and poor fetal growth. A recent review of randomized, controlled trials examines the evidence for such beneficial effects of fish oil supplements and other sources of omega-3 fatty acids in pregnancy.

To be included in this review, all trials had to meet certain criteria. First, all studies had to involve random assignment of the women to either a treatment or a control group and at least some attempt to conceal the group to which the subjects belonged. A second requirement was that women who already had pre-eclampsia or poor fetal growth at the start of the study be excluded. Two independent reviewers scored the studies on the quality of the design.

The final review included six trials of acceptable quality involving 2755 women. Four studies used only fish oil; 1 used fish oil and primrose oil; and 1 used eggs enriched in docosahexaenoic acid (DHA), a member of the omega-3 family. The amount of fatty acids most commonly provided by the supplement was 2.7 g. per day. To get that amount from food alone, a person would need to eat about 300 g of salmon.

Main findings from the review include the following:

- Fish oil supplements lengthen the duration of pregnancy by 2-3 days; slightly increase birth weight; and slightly reduce the chances of delivering before 34 weeks;
- Fish oil supplements do not have an effect on reducing risk of delivering a small-for-gestational age baby or preventing pre-eclampsia;
- There were no clear differences in other measures of maternal or infant morbidity or mortality; and
- Women who took the fish oil supplements complained more often of belching and unpleasant taste of the supplement, compared to controls.

Conclusions and Implications: There is not enough evidence to support routine use of fish oil supplements in all pregnant women to reduce the risk of pre-eclampsia, preterm birth or poor fetal growth.

Source: Makrides M, Duley L, Olsen SF. Marine oil, and other prostaglandin precursor supplementation, for pregnancy uncomplicated by pre-eclampsia or intrauterine growth restriction (Review). Cochrane Database of Systematic Review 2006, Issue 3, Art. No. CD003402

***Maternal and Infant Nutrition Briefs* is a research-based newsletter prepared by Dr. Lucia Kaiser, 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. Back issues of this newsletter are available on-line at: http://nutrition.ucdavis.edu/briefs/.**