Maternal & Infant Nutrition Briefs

September/October 2005

- **Should Borderline Glucose Intolerance during Pregnancy be Treated?**
- **Effect of Mother's Diet on Colic in Breastfed Infants**
- **Steps to Avoid Methemoglobinemia in Infants**
- **Lack of Postpartum Follow-up for Gestational Diabetes**

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

Should Borderline Glucose Intolerance during Pregnancy be Treated?

The benefits of treating gestational diabetes to prevent complications are well-accepted. However, less is known about appropriate care for women who have borderline glucose intolerance during pregnancy. In these women, their initial glucose challenge test is above normal (>140 mg/dl or 7.8 mmol/l) but the follow-up oral glucose tolerance test is normal. Most often, these women are not actively treated. The purpose of this study was to determine the effect of providing nutrition therapy on pregnancy outcomes in women with borderline glucose intolerance.

The study involved a randomized, controlled trial, conducted among 300 women recruited through a diabetes and pregnancy center in Italy. These women, all of whom were pregnant and had borderline glucose intolerance, were randomly assigned to usual care (group A) or a dietary intervention (group B). A group of pregnant women with normal blood glucose was included for comparison (group C). For group B, the diet provided 24-30 kcal/ kg body weight (50-55% carbohydrate, 25-30% protein, 20-25% fat), divided into 3 meals and 2-3 snacks. Group B women also received follow-up and blood glucose testing every two weeks. The main outcomes included rate of Caesarian sections, macrosomia (birth weight > 4000 gm), large-for-gestational age (LGA), and small-for-gestational age (SGA). The three groups were similar in pre-pregnant body mass index and maternal age.

Maternal weight gain during pregnancy was similar among the three groups. Rate of Caesarian sections was not different among group A (28%) and B (29%) but slightly lower among the comparison women in group C (24%). Although not significantly different, the rates of macrosomia and LGA tended to be lower in the intervention, compared to the usual care group [% macrosomia: 10.7% (group A) and 5.3% (group B); %LGA: 14% (group A) and 6% (group B)]. Risk of SGA did not differ among the groups. Ponderal index was significantly higher in group A (2.73) than in either group B (2.64) or C (2.64), $p < 0.030$. In women with gestational diabetes, high insulin levels may cause asymmetric fetal growth,

which is reflected in a high ponderal index. These results suggest the treated group of infants may have had a more normal growth pattern than the untreated group. Since the women were aware of the differences in treatment (i.e., the study was not blinded), the real effects of the intervention may have been underestimated.

Conclusions and Implications: These findings suggest that pregnant women with borderline glucose intolerance might benefit from dietary intervention and follow-up. However, additional studies are needed to confirm these results and determine the optimal level of care.
Source: Bonomo M, Corica D, Mion E et. al. Evaluating the therapeutic approach in pregnancies complicated by borderline glucose intolerance: a randomized clinical trial. Diabetes Med. 2005; 22: 1536-1541.

Effect of Mother's Diet on Colic in Breastfed Infants

About 28% of all infants have colic in the first few months of life. In formula-fed infants, switching from a cow's milk-based formula to an extensively hydrolyzed casein- or whey-based formula may relieve symptoms. Studies among colicky breastfed infants have been inconclusive regarding the benefits of eliminating certain allergenic foods from the mother's diet. Exactly how these foods (or their antigens) might trigger immune or hormonal responses leading to colic is not known. However, antigens from cow's milk, peanuts, eggs, and wheat have been found in human milk. The purpose of this short-term, randomized, clinical trial was to determine whether eliminating allergenic foods from the mother's diet can reduce the amount of crying and distress in colicky breastfed babies.

The study was carried out in Australia, where nursing mothers of healthy, term infants with colic were randomly assigned to either a low allergen (n=53) or control diet (n=54). In this study, colic was defined as crying/fussing/distress exceeding 180 minutes a day at least 3 days a week. While maintaining their usual diet of meat, vegetables, fruit, corn, and rice, mothers on the low allergen diet avoided wheat, dairy, peanuts, tree nuts, soy, eggs, and fish and took a calcium supplement. In contrast, the control diet included daily servings of soy milk, cow's milk, peanut, and chocolate, along with the usual diet. Before and after being on the diet for one week, the mothers kept daily records of how many hours a day their infants cried or were fussy. They also reported whether or not they felt their infant's behavior improved over the one-week study. The mothers completed a 2-day food diary so that compliance with the diet could be determined.

At the end of the study, two-thirds of the infants still had colic. According to the daily records, 75% of infants in the treatment group showed improvement (i.e., fewer hours a day of distress), compared to 37% in the control group ($p < 0.001$). There was no difference, however, in the mothers' overall report of whether or not infant behavior improved. However, while 98% of the women in low allergen group followed the diet, only 59% of the control women kept to the diet. The remainder had started to eliminate some of the allergenic foods from their diet. This compliance problem illustrates some of the challenges in trying to examine the effects of an elimination diet in a free-living population. The time period—one week—may also have been too short, and the authors were unable to examine whether resuming the usual diet would cause infant symptoms of colic to increase.

Conclusions and Implications: Avoiding certain allergenic foods while nursing may reduce symptoms of colic in infants, but more studies are needed. Highly restrictive diets may also pose risk. Nursing mothers who choose to eliminate a lot of foods from their diets should be

monitored by a health professional with nutrition expertise.

Source: Hill DJ, Roy N, Heine RG, et. al. Effect of a low allergen maternal diet on colic among breastfed infants: a randomized, controlled trial. Pediatrics 2005; 116: 709-715

Steps to Avoid Methemoglobinemia in Infants

Nitrate poisoning, resulting in methemoglobinemia, continues to be a potential problem for infants in the United States. Methemoglobinemia often occurs in young infants, fed formula prepared with nitrate-contaminated well water. In the body, nitrates are converted to nitrites which can oxidize the iron in hemoglobin, preventing its ability to carry and deliver oxygen to the cells. As a result, methemoglobinemia develops. Infants less than three months are particularly vulnerable because fetal hemoglobin is more easily oxidized than is regular hemoglobin. Compared to older infants, younger babies have an intestinal tract that is somewhat less acidic, enabling the flora to convert nitrate to nitrite at a more rapid rate. About 2 million families in the United States drink well water that has high levels of nitrate (> 10 ppm nitrate nitrogen), putting at risk 40,000 infants under the age of six months.

Some vegetables, including carrots, beets, spinach, squash, and green beans, contain high levels of nitrates. Commercially-prepared baby foods are not considered to be a problem, since manufacturers monitor nitrate content of the raw foods used in their products. However, even commercially-prepared spinach may exceed upper limits of nitrates and should not be given to young infants (less than three months). Home-made baby foods, containing carrots, beets, spinach, squash or green beans, should not be given to infants less than three months old. If parents follow the current recommendations of the American Academy of Pediatrics to wait until 6 months to introduce solid foods, either commercially- or home-prepared foods should be safe at that point. Refrigerating containers after first use and discarding unused foods after 24 hours are additional steps to ensure safety. Current recommendations to prevent methemoglobinemia include the following:

• Ask about source of home water supplies at prenatal and well-baby visits. If the family gets water from a private well, the water should be tested for nitrate. Water with high levels of nitrate (>10 ppm) should not be used to prepare formula or baby foods. Ordinary water softeners do not remove nitrates, but there are some more expensive home systems that may be effective.

• Do not give home-prepared carrots, beets, green beans, squash, or spinach to infants under the age of 3 months. Note: current recommendations are to wait until 6 months to introduce any solid foods.

• Exclusively breastfed infants are not at risk for methemoglobinemia, even if their mothers drink water with high levels of nitrate (up to 100 ppm nitrate nitrogen).

Conclusions and Implications: Nitrate poisoning, resulting in methemoglobinemia, is a potential problem, especially among infants less than three months who are fed formula prepared with well water.

Source: Greer F, Shannon M, the Committee on Nutrition and the Committee on Environmental Health. Infant methemoglobinemia: the role of dietary nitrate in food and water. Pediatrics 2005; 116: 784-786.

Lack of Postpartum Follow-up for Gestational Diabetes

Among women who have had gestational diabetes, 17 to 63% will develop diabetes mellitus within 5 to 16 years after delivery. The American Diabetes Association (ADA) recommends diabetes screening, using either a fasting glucose or oral glucose tolerance test, at 6 weeks postpartum. If the results are normal, follow-up diabetes screening should occur at least every 3 years. Yearly follow-up screening is recommended for women with impaired fasting glucose or glucose tolerance. However, since the American College of Obstetricians and Gynecologists (ACOG) does not make a specific recommendation on postpartum diabetes screening, many women with a history of gestational diabetes may not receive follow-up screening. The purpose of this article was to examine the extent of postpartum diabetes screening in women who were diagnosed with gestational diabetes.

The study involved a review of medical records of women receiving care from two large Massachusetts hospitals. All women in the study had delivered a liveborn infant, did not have pre-existing diabetes, and continued to receive follow-up care in the same institution. The main outcome was time between delivery and first diabetes screening. Of the 195 women in the sample, 45.2% were white; 23.9% were Hispanic; and 10.2% were African American. About 64% had private insurance, and 23% had Medicaid.

Only 37% of the women were screened according to the ADA recommendations (i.e, fasting glucose or glucose tolerance test). However, the median time to receive screening was 428 days. Using a broader definition of screening (fasting or random glucose test, glycosylated hemoglobin, or glucose tolerance test), the authors found that only 67% of the women were screened, with a median time of 136 days to the date of testing. The authors did not find any relationship between mother's age, race, ethnicity, income, type of insurance, or body mass index and postpartum diabetes screening. Although the study is based on a chart review from two hospitals in one state, the findings are consistent with other studies.

Conclusions and Implications: Many women at high-risk of developing diabetes may not be receiving the follow-up care recommended by the American Diabetes Association.

Source: Smirnakis KV, Chasan-Taber L, Wolf M et al. Postpartum diabetes screening in women with a history of gestational diabetes. Obstet Gynecol 2005; 106: 1297-1303.

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.