



# Maternal and Infant Nutrition Briefs

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## **Bottle-Emptying Behavior is Difficult to Change**

Rapid weight gain during infancy has been linked to childhood obesity. Formula-fed infants consume more energy and gain weight faster than breastfed infants. One possible reason for this difference may be that some formula feeding mothers encourage babies to finish or “empty” the bottle. By overriding the infant’s natural ability to stop eating when full, these mothers are less responsive to infant satiety cues and overfeed their babies. The purpose of this study was to determine the effectiveness of an intervention to increase responsive feeding in low-income mothers. Specifically, the authors explored whether the intervention could discourage bottle-emptying behavior and reduce the amount of formula fed to infants.

The study design involved a double-blind, randomized, controlled trial among mothers and infants enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program. To be included in the study, the infants had to have a birth weight of 2500 grams or higher and be exclusively formula-fed, healthy, and 3-10 weeks of age. Only English- or Spanish-speaking mothers with infants were recruited. While the control group received the usual WIC infant feeding guidance, the intervention mothers received additional information about being aware of and responsive to infant satiety cues, not forcing the infant to empty the bottle, and offering no more than 6 oz of formula at each feeding. Mothers and infants were weighed and measured at baseline and after the class when the infant was about 4 months old. At baseline, 2 weeks post-class, and when the infant was 4 months, the mothers completed 2-day formula intake records (none of the babies consumed any solid foods). The authors had planned to recruit 125 mother-infant pairs per group but only 18 intervention and 20 control pairs completed all phases of the study.

The educational intervention, as implemented, was unsuccessful in changing the targeted infant feeding practices. Formula intake was not different between the groups at any time (before, mid-point, 4 month follow-up). The frequency of bottle-emptying behavior actually increased during the study for both groups (from about 50% to 60% of the feedings). Similarly, the mothers offered larger amounts of formula (> 6 oz per feeding) over time for both groups. The average intake of formula at 4 months of age was 1100 ml/day (37oz), which far exceeds the amount of formula provided by WIC from either the current (26 oz) or soon-to-be implemented new food packages (29.5 oz for a 4-5 month infant). For reasons that are unclear and probably unrelated to the education, the intervention infants actually gained more weight than the controls.

*Conclusions and Implications: A double-blind randomized controlled intervention to increase responsive feeding and reduce overfeeding was unsuccessful in changing bottle-emptying behaviors of WIC mothers. To change that behavior in low-income women, more intensive educational efforts may be needed.*

*Source: Kavanagh KF, Cohen RJ, Heinig MJ, Dewey KG. Educational intervention to modify bottle-feeding behaviors among formula-feeding mothers in the WIC program: impact on infant formula intake and weight gain. JNEB 2008; 40:244-250.*

## **Trends in Gestational Diabetes**

Since obesity rates continue to rise among U.S. women, it is important to examine national trends in prevalence of gestational diabetes mellitus (GDM). The study used data from the National Hospital Discharge Survey, which contains records from more than 58 million births in the U.S. from 1989 to 2004. Data in this survey are from short stays at non-military or federal hospitals. The authors selected a random sample from each hospital in the database. Race was coded as white or black, not separately identifying Hispanic ethnicity.

Overall prevalence of GDM among pregnant women, ages 14-45 years, increased from 1.9% in 1989-90 to 4.2% in 2003-04. Among all age groups, the prevalence was highest (5.8%) among women, ages 35 years and older. Prevalence of GDM increased sharply in young black women (less than 25 years) from 0.6% in 1989-90 to 2.1% in 2003-04 (260% change). As a comparison, rates among young white women, less than 25 yrs., increased 13%, from 1.2% in 1989-90 to 1.4% in 2003-04.

*Conclusions and Implications: Prevalence of gestational diabetes has more than doubled between 1989-90 and 2003-04. This trend may be due to increased rates of maternal obesity, as well as better access to prenatal care and changes in screening practices.*

**Source: Getahun D, Nath C, Ananth CV, Chavez MR, Smulian JC. Gestational diabetes in the United States: temporal trends 1989 through 2004. Am J Obstet & Gynecol. 2008; 198: 525.e1-525.e5.**

## **Can Prenatal Supplements of Marine Oil Reduce Asthma Risk?**

Determining the benefits of marine oil supplements during pregnancy is an active area of research. Marine oils provide n-3 polyunsaturated fatty acids, including eicosapentaenoic and docosahexaenoic acids, which can affect immune function. Marine oil fatty acids may be converted to compounds that have anti-inflammatory and other protective properties. The purpose of the study was to determine whether marine oil supplements, taken during pregnancy, reduce the risk of asthma in the offspring later in life.

The findings reported here are from a long-term follow-up of a randomized, controlled trial conducted in a population-based sample in Denmark from 1989 to 1990. In the

original trial, 533 pregnant women were randomly assigned to a marine oil, olive oil, or no oil (control) group. The amount of n-3 marine polyunsaturated fatty acid consumed was 2.7 g/day, which was about 10 times higher than the average intake in Denmark. Because all Danish citizens are included in the National Patient Registry, the researchers were able to track 528 children of the original cohort during adolescence (16 years later). The registry contains data on hospitalizations, ambulatory visits, and emergency room visits related to a diagnosis of asthma. While this method may miss milder cases of asthma, there appears to be no reason to expect a systematic bias associated with any of the groups.

Prenatal use of fish oil was associated with a significantly lower risk of any asthma (63% lower) and allergic asthma (87% lower), compared to the olive oil group. Interestingly, risk of asthma in the control (no oil) group was very similar to that of the fish oil group. Control mothers, being aware of the study's purpose and the potential benefits of marine oil, may have taken supplements on their own but the authors did not provide any evidence to support that explanation. They also did not state whether the marine and olive oil mothers were unaware or "blinded" to their group assignment, another potential limitation to the study's design.

*Conclusions and Implications: This randomized, controlled study, carried out in Denmark, found long-term benefits of marine oil prenatal supplements on reducing risk of asthma in the children. A strength of the study was its ability to track most of the sample 16 years later. Larger randomized controlled trials, with long-term follow-up, are needed to explain how marine oils, taken prenatally, affect outcomes.*

**Source: Olssen SF, Osterdal ML, Salvig JD, Mortensen LM Rytter D, Secher NJ, Henriksen. Fish oil intake compared with olive oil intake in late pregnancy and asthma in the offspring: 16 y of registry-based follow-up from a randomized controlled trial. Am J Clin Nutr 2008; 88: 167-175.**

## **Association between a Breast Pump Loan Program and Breastfeeding**

Although the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) has provided breast pumps to breastfeeding mothers for many years, very little research is available on the effectiveness of breast pump loan programs. The purpose of this study was to determine whether a program providing electric breast pumps to low-income working women would support continued breastfeeding and reduce the request for formula from WIC.

The study was conducted in a large WIC agency in Los Angeles, where additional funds were available to purchase and lend electric pumps to working mothers. Since the number of pumps was limited, only some women, on a first-come, first-serve basis, received the pumps. Eligibility for the program included: returning to a full-time (>32 hrs/week) paid work; intending to breastfeed exclusively; willing to release job information; and agreeing to return the pump upon requesting WIC formula. The authors were not able to randomly assign mothers to treatment and control groups. Instead, they compared three groups: 1) women who receive pumps immediately (pump); 2) women who received

pumps after some delay (wait list delay); and 3) women who were on the wait list but never received a pump (control). The WIC agency mailed a packet regarding California law that requires breastfeeding accommodations in the workplace to the employers of the women in all three groups. Outcome measures were based on the length of time the breastfeeding mother did not request formula from WIC. This measure is only a proxy for exclusive breastfeeding, because a WIC mother can purchase formula on her own and still be considered as exclusively breastfeeding for WIC's purposes.

About half of the women worked for businesses with 20 or fewer employees. Eighty-three WIC mothers received pumps upon their return to full-time work; 92 mothers got their pumps after a delay due to pump availability; and 33 never got a pump. There were no differences in age, education, ethnicity or any other demographic characteristics among the women in the three groups. Mothers who received an electric pump (either pump or wait list delay groups) did not request formula from WIC for more than 8 months, compared to only 4 months among the control mothers ( $p < 0.0001$ ). After controlling for demographic and workplace differences, mothers who received the pump (with or without delay) were 2.9 to 5.5 times as likely not to have requested WIC formula at 6 months, compared to the controls. Those who received pumps right away were 3 times as likely not to have requested WIC formula during the first 12 months, compared to controls. The authors note that the findings cannot be generalized to all WIC mothers, because only women who wanted to breastfeed exclusively were eligible for the program. Also, since the authors could not randomly assign the women to the groups, some factors influencing breastfeeding patterns may have been overlooked.

*Conclusions and Implications: Although the study has some limitations in its design, the findings suggest that loaning electric pumps to highly motivated, low-income working mothers may reduce their request for formula from WIC. The authors estimate the monthly cost of the program to be about \$46.50 per mother. Based on the estimated costs of the new WIC Food packages, the savings in WIC foods for the mother-infant pair would be about \$7.84 per month in moving from a fully formula-fed infant to an exclusively breastfed infant. However, if potential savings to the health care system from exclusive breastfeeding were also considered, the estimated savings from a pump loan program would likely be much higher and demonstrate cost effectiveness.*

**Source: Meehan K, Harrison GG, Affi AA, Nickel N, Jenks E, and Ramirez A. The association between an electric pump loan program and the timing of requests for formula by working mothers in WIC. J Hum Lact 2008; 24: 150-158**

*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/>. The University of California, in commonplace with the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and the Rehabilitation Act of 1973, does not discriminate on the basis of race, creed, religion, color, national origin, sex, or mental or physical handicap in any of its programs or activities, or with respect to any of its employment policies, practices, or procedures. The University of California does not discriminate on the basis of age, ancestry, sexual orientation, marital status, citizenship, medical condition (as defined in section 12926 of the California Government Code), nor because individuals are disabled or Vietnam era veterans. Inquires regarding this policy maybe directed to the Director, Office of the Affirmative Action, Division of Agriculture and Natural Resources, 300 Lakeside Drive, Oakland, CA 94612-3550. (510) 987-0097.