Maternal & Infant Nutrition Briefs

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Hormonal Effects of Obesity on Breastfeeding

Initiation and duration of breastfeeding tend to be lower among certain groups of overweight and obese women, compared to mothers of normal weight. Although overweight and obese women are at increased risk of early breastfeeding failure, the underlying reasons are unknown. One possibility is that dramatic hormonal changes, occurring in the early postpartum period, may differ among normal and overweight/obese women. Specifically, the immediate fall in progesterone levels postpartum, in combination with prolactin, is necessary to trigger full milk production. If progesterone levels remain high or prolactin fails to increase during nursing, then milk production may be low. The purpose of this study was to compare hormonal changes during the first week postpartum in normal and overweight/obese nursing mothers.

Forty nursing women from upstate New York participated in this observational study (normal weight: n=23 and overweight/obese: n=17). Overweight/obese was defined as having a pre-pregnancy body mass index (BMI) greater than 26. The researchers collected blood samples before and after nursing at 48 hours and 7 days postpartum. The samples were later analyzed for progesterone, prolactin, insulin, estradiol, leptin, and glucose. Data on the mother's weight, height, and prenatal weight gain and infant birth weight were taken from the medical records.

In both groups, progesterone and estradiol decreased as expected over the course of the study (no significant differences). However, prolactin response during nursing was much lower in the overweight/obese women, compared to the normal weight mothers ($p < 0.001$). At 48 hours, three variables were related to a lower-than-normal prolactin response: maternal overweight/obesity, infant birth weight, and primaparity. At 7 days, only maternal overweight/obesity was related to reduced prolactin response. By nursing for longer periods of time, the overweight and obese women were able to overcome their otherwise low prolactin response to infant suckling. Given the small sample size and their inability to collect

fasting blood samples, the authors cannot rule out the possibility that other hormonal differences, particularly insulin, may exist.

Conclusions and Implications: Overweight and obese mothers experience a lower prolactin response to nursing, compared to normal weight mothers. This hormonal difference may have implications for milk production and ultimately, duration of breastfeeding. Contact with a lactation consultant before discharge may help overweight and obese women succeed at breastfeeding.

Source: Rasmussen KM, Kjolhede CL Prepregnant overweight and obesity diminish the prolactin response to suckling in the first week postpartum. Pediatrics 113 (5) e465-471.

Do Vitamin Supplements Increase Allergy Risk?

In animals, vitamins can cause T-cells to differentiate into particular types, which may increase the chances of an allergic response to certain antigens. Very little is known about the effects of providing vitamins to young infants on the later development of asthma and allergies. However, multivitamin use is common in young children--50% of toddlers take some sort of vitamin. This study uses data from a large national study and a follow-up survey conducted later to determine if early vitamin supplementation increases the risk of food allergies and asthma at three years of age.

The data source was the national 1988 Maternal-Infant Health Survey and the follow-up study of the same patients in 1991. More than 8000 mother-infant pairs participated in the study, with more than 50% being black or having an income less than $20,000 per year. In the survey, parents reported the number of months from 0-6 that they gave their babies vitamin/mineral drops at least three times a week. Data from nearly 90% of the original respondents in 1988 were successfully linked to the follow-up data from 1991. In the follow-up study, parents reported whether their children (now three years old) were taking vitamins and if a health professional had diagnosed asthma or food allergy in that child.

By 3 years of age, 10% of the children had been diagnosed with asthma and about 5%, with a food allergy. In black children, early vitamin use (before 6 months of age) significantly increased the risk of asthma (odds ratio: 1.27, $p = 0.02$). In formula-fed children, early vitamin use increased the risk of food allergies (odds ratio: 1.63, $p < 0.001$). Unfortunately, the reasons for giving supplements are not known—perhaps the infant was sick or had a family history of allergies or asthma. Also, reliance on parental report of asthma and allergies could mean that some cases were missed or not accurately diagnosed.

Conclusion and Implications: Early vitamin supplementation during infancy may increase the risk of asthma or food allergies in some children, but additional studies are needed to confirm these findings.

Source: Milner JD, Stein DM, McCarter R, Moon RY. Early infant multivitamin supplementation is associated with increased risk for food allergy and asthma. Pediatrics 114 (1): 27-32.

Multivitamins during Pregnancy Slows Progression of AIDS

Worldwide, 40 million people are infected with the human immunodeficiency virus (HIV). Antiretroviral therapy is available for less than 8% of the patients with advanced disease who

are eligible for the treatment. Multivitamin supplements may be useful as a low-cost intervention to slow the progression of HIV and thus delay the time until antiretroviral medications are given. The purpose of this study, carried out in Tanzania, was to examine to effect of multivitamins on the progression of HIV in pregnant women infected with HIV.

The study involved a randomized, double-blind, controlled trial among 1078 pregnant women with HIV. The women were assigned to one of the following groups during their pregnancies: 1) control or placebo; 2) multivitamins including vitamin A; 3) vitamin A alone; or 4) multivitamins alone. All of the women received iron and folic acid. The multivitamin supplements contained thiamin, riboflavin, niacin, and vitamins C, B12, B6, and E. Compliance in taking the supplements or placebo was similar in all groups and overall high (79%). The main outcome was the progression of HIV disease to more advanced stages or death from AIDS-related causes. Follow-up of the women continued for a median of 71 months.

The multivitamin supplement alone (without vitamin A) was the most effective treatment, with 24.7% of the women having a poor outcome compared to 31.1% in the placebo group (relative risk: 0.71, $p < 0.04$). The other groups receiving vitamin A showed no health or survival advantage over the control group. The multivitamin group (without vitamin A) also experienced fewer oral and gastrointestinal problems and had lower viral loads than the controls. The authors suggest that the B-vitamins may help protect the epithelium cells in the mouth and GI tract, improving appetite and quality of life. The antioxidants—vitamin C and E—may have an effect on reducing HIV replication.

Conclusions and Implications: While multivitamins have limited benefits compared to antiretroviral treatment, supplementation may provide a low-cost intervention to delay HIV progression in pregnant women who are in the early stages of the infection.

Source: Fawzi WW, Msamanga GI, Spiegelman D, Wei R, Kapiga S, Villamor E, Mwakagile D, Mugusi F, Hertzmark E, Essex M, Hunter DJ. A randomized trial of multivitamin supplements and HIV disease progression and mortality N. Eng J Med 2004; 351: 23-32

Predicting Overweight at Birth

Although public health strategies are definitely needed to prevent childhood obesity, health professionals continue to need individual-level approaches to deal with the current obesity epidemic. For example, what characteristics, identifiable at birth, are predictors of overweight among preschoolers? This question is particularly relevant to public health nutrition programs, including the Special Supplemental Nutrition program for Women, Infants, and Children (WIC), so that appropriate targeting occurs and early intervention can be provided. This study used a WIC dataset from Ohio to do a retrospective analysis of prenatal factors that are related to development of overweight in preschool children.

The paper describes in detail how WIC records were linked to birth certificates for a cohort of children born in Ohio from 1992-1996. That description may be useful to other WIC programs who want to examine their own datasets. The ethnicity was representative of the low-income, WIC population in Ohio: 79.5% white, 17.4% black, and 2.4% Hispanic. WIC staff measured the weight and height or length of the mothers and children in their clinics. Mother's body mass index (BMI) at the first trimester visit was used to classify her weight status. Preschoolers with a BMI > 95 th percentile for their age and gender were defined as obese1.

The total sample size included 8494 mother-child pairs.

Thirty percent of the mothers were obese (i.e., BMI > 30), and 6% had a BMI > 40. By ethnicity, 29% of the white, 36% of the black, and 24% of the Hispanic mothers were obese at their first trimester visit. Among preschoolers whose mothers were obese in early pregnancy, 15.1% of the 2-year-olds, 20.6% of the 3-year-olds and 24.1% pf the 4-year-olds were obese. In comparison, only 9% of the 4-year-olds with normal weight mothers were obese. Early maternal obesity was the strongest predictor of preschooler obesity, although large-for gestational-age, smoking during pregnancy, and first-born status were other significant predictors.

A study that we just published also found that mother's weight status and large birth weight were independent correlates of overweight among 237 low-income Mexican-American preschoolers. The magnitude of the effect is quite similar between the two studies. In the analysis, we were also able to consider simultaneously the effects of infant and child feeding practices. Breastfeeding was not related to risk of preschooler overweight, defined as BMI > the 95th percentile. However, despite the fact that 71% of the mothers breastfed their infants for at least 6 months, only 7% exclusively breastfed (i.e., gave no formula). Use of controlling parental feeding strategies--including bribes, threats, and rules about finishing one's plate—were common in this population but unrelated to preschooler weight status. We concluded, however, that high juice intake and child access to snacks, are variables that need closer examination in future studies in this population.

Conclusions and Implications: Maternal obesity during the first trimester of pregnancy is a predictor of childhood overweight in children, as young as two years of age.

1 Note: the Centers for Disease Control defines this cutoff as "overweight".

Source: Whitaker RC. Predicting preschooler obesity at birth: the role of maternal obesity in early pregnancy. Pediatrics 114 (1): e29-e36.
Melgar-Quiñonez HR, Kaiser LK. Relationship of child-feeding strategies to overweight in low-income Mexican-American preschool-aged children. J Am Diet Assoc. 104 (7): 1110-1119.

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