Maternal & Infant Nutrition Briefs

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Weight Gain in the First Week of Life and Overweight in Adults

Early nutrition appears to have a programming effect on health later in life. Recent studies suggest that very rapid weight gains during infancy are associated with becoming overweight in childhood. Since public health efforts are focusing on early prevention of obesity, identifying critical periods can point the way to more effective interventions. The purpose of this study was to examine the relationship of rapid infant weight gain to the risk of becoming overweight in adulthood.

The authors used data from the Iowa infant growth study and a follow-up interview more than 20 years later to determine the relationship of early growth patterns to adult overweight status. Compiled from 1965-1978, the original dataset included 952 healthy, white, formula-fed infants whose growth was measured from birth to 112 days of life. The authors did a nationwide search to locate these individuals during young adulthood. They were able to find and interview by phone72% (n=653) of those eligible for the follow-up study. A primary outcome was adult body mass index (BMI), based on self-reported weights and heights.

The median age of the subjects at follow-up was 23 years. While only 5.7% were obese, about 32% were overweight (BMI>25 kg/m2). Absolute weight gain in the first eight days of life was significantly associated with being overweight as a young adult. A 100 gm increase in infant weight gain during the first week of life was associated with 28% greater risk of becoming overweight, even after accounting for the positive effects of birth weight, parents' BMI, age, and income. Other factors associated with increased risk were use of soy formula (reason unknown), greater mother's weight (but not father's weight), and higher birth weight.

Conclusions and Implications: In formula-fed infants, a rapid weight gain in the first week of life is associated with overweight in adulthood. Based on this observational study, one cannot

infer a cause and effect relationship because underlying genetic or other factors could cause for both the early infant weight gain pattern and overweight status in adulthood. These findings also do not necessarily apply to nonwhite, racially/ethnically diverse populations.

Source: Stettler N, Stallings VA, Troxel AB, Zhao J, Schinnar R, Nelson SE, Ziegler EE, Strom BL. Weight gain in the first week of life and overweight in adults. A cohort study of European American subjects fed infant formula. Circulation 2005; 111:1897-1903

Overweight and Sweet Drink Consumption in Preschoolers

Reducing consumption of sweetened beverages is rapidly becoming a focal point for public health interventions to prevent obesity. Since 1977, consumption of carbonated soft drinks and fruit drinks has increased by 68% and 42%, respectively. A number of studies, including a least one randomized trial, have found a positive association between various sweetened beverages and overweight in school children. One question that is often raised is: do all sweetened beverages have the same effect? Cross-sectional and observational studies have found some conflicting results on the association of juice and overweight in preschoolers, but none of these studies have simultaneously examined the role of other noncarbonated sweetened beverages. The purpose of this study was to determine the effect of juice and other sweetened beverages on overweight status in a large group of preschool children.

The sample consisted of 10,904 two- and three- year old children who were monitored through the Missouri Pediatric Surveillance System and participated in a demonstration project funded by the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) from 2000-2002. Weight and height data are available on these children at baseline (ages 2-3 yrs) and one year later. Based on dietary data from the Harvard Food Frequency Questionnaire, the authors calculated the number of drinks per day of vitamin C-containing fruit juice, other fruit juice, fruit drinks (like Kool-aid, lemonade), and carbonated beverages. They also considered in their analysis intake of high-fat foods, other high-sugar foods, and total energy. Overweight, the main outcome variable, was defined as body mass index (BMI) > 95th percentile. The authors analyzed the effects of sweetened beverages on overweight status, after controlling for child's age, ethnicity, and birth weight.

At baseline, 75% of the children were normal/underweight; 14% were at-risk of overweight, and 10% were overweight. By the one year follow-up, 25% of those originally at-risk of overweight became overweight and 67% of those overweight at baseline remained so at follow-up. Children who were at-risk of overweight or overweight at baseline were twice as likely to become or stay overweight if they drank more than one sweetened beverage a day. This effect of sweetened beverages appears to be independent of other sweet or high-fat foods that have also been linked to overweight. Sweetened drinks, not including carbonated soft drinks, had a similar, significant association with overweight. High intake of juice alone was only marginally related to risk of remaining overweight from baseline to follow-up.

Conclusions and Implications: This study and others continue to suggest a relationship between greater consumption of sweetened beverages and overweight status in children. To understand the underlying causes and guide prevention efforts, well-designed randomized trials are needed.

Source: Welsh JA, Cogswell ME, Rogers S, Rockett H, Mei Z, Grummer-Strawn LM. Overweight among low-income preschool children associated with the consumption of sweet

drinks: Missouri. 1999-2002 Pediatrics 2005: 115: 223-229.

Bottle Use Associated with Increased Risk of Candida Infections

Candida species are fungi that can live in human tissues and cause infections in the mouth (thrush), vagina, and skin (as on the breast). Sometimes the organism can be present without obvious symptoms. The most common signs and symptoms associated with infection in nursing mothers include burning nipples, painful breasts, stabbing pain throughout the breast, and shiny or flaky skin on the nipple or areola area. Usually, doctors make a diagnosis based on clinical signs and symptoms but a new technique for culturing milk samples can also be used. The purpose of this study was to determine Candida infection rates using this technique and risk factors in a group of lactating mothers.

Recruited from private clinics in Reno Nevada, the sample included 100 breastfeeding mothers and, as a comparison group, 40 nonbreastfeeding, nonpregnant women, of similar age, ethnicity, and educational background. The subjects used sterile swabs to collect samples from skin on the nipples and breast. The breastfeeding women also provided milk samples and swabs of the baby's mouth. Other data, collected by interview, included history of vaginal or other yeast infections and antibiotic use in the past nine months. The first interview and sampling occurred about two weeks after delivery; a follow-up interview took place at nine weeks postpartum.

Twenty-three percent of the breastfeeding mothers tested positive for Candida, compared to none of the nonbreastfeeding women. Twenty percent of the infants tested positive, including five infants whose mothers had tested negative. In the mothers, the strongest risk factors for presence of Candida were bottle use during the first two weeks and duration of pregnancy beyond 40 weeks, whereas antibiotic use at delivery reduced the risk. In the infants, bottle use and mother's multiparity increased the risk. Among the women who tested positive at two weeks, only 43% were still breastfeeding at nine weeks, compared to 69% of those who tested negative for Candida ($p < 0.27$). Although the exact reasons for these associations are not known, iron-fortified formula may stimulate growth of the organism in the infant's mouth. Longer duration of pregnancy may cause changes in the vaginal flora that enhance growth of Candida. Infants of multiparous mothers may be exposed to Candida through older siblings.

Conclusions and Implications: Although "cause and effect" cannot be proven in observational studies, bottle use in the first two weeks of life may increase the risk of Candida infection in mothers and infants. Candida infection is associated with early termination of breastfeeding.

Source: Morrill JF, Heinig MJ, Pappagianis D, Dewey KG. Risk factors for mammary candidosis among lactating women. JOGNN 2005; 34: 37-45.

Vitamin C to Prevent Premature Rupture of Membranes

The major known cause of preterm delivery is premature rupture of the chorioamniotic membranes. Premature rupture occurs in about 10-20% of all pregnancies and increases rates of morbidity and mortality worldwide. Low intake of vitamin C could be a factor since this vitamin plays a role in synthesis of collagen, which in turn maintains the strength of chorioamniotic membranes during pregnancy. The purpose of this study was to determine whether daily vitamin C supplements reduce the risk of premature rupture of membranes during pregnancy.

The study was a double-blind, randomized controlled trial that took place in Mexico. Starting at 20 weeks, healthy, nonsmoking, pregnant women were assigned to either a control (placebo) or treatment (100 mg/day vitamin C) group. None of the women were taking any other supplements. The researchers collected data on the subjects' usual intake of vitamin C using a food frequency questionnaire and plasma and leukocyte vitamin C levels, among other clinical measures. The main outcome was the incidence of premature rupture of the membranes.

The groups were similar in age, nutritional status, number of previous pregnancies, and socioeconomic status (lower middle-class). Their mean dietary intake of vitamin C was similar (controls: 63 mg and treatment: 68 mg). More than 80% took their placebo or vitamin C supplements as directed. The groups did not differ in plasma vitamin C levels but leucocyte vitamin C increased in the treatment group and dropped in the controls ($p < 0.0001$). The incidence of premature rupture was 8% in the supplemented group, compared to 25% in controls ($p < 0.018$). Incidence of preterm labor did not differ among the groups (13% in supplemented women, 24% in controls, NS).

Conclusions and Implications: This study is the first randomized, controlled trial to show a beneficial effect of vitamin C supplements on reducing incidence of premature rupture of membranes. The sample included Mexican women whose habitual vitamin C intake (63-68 mg) is lower than that of low-income US pregnant women (mean vitamin C intake: 136 mg). Thus, whether or not a similar effect would occur in a population with higher vitamin C intakes is unknown.

Source: Casanueva E, Ripoll C, Tolentino M, Morales RM, Pfeffer F, Vilchis P, Vadillo-Ortega F. Vitamin C supplementation to prevent premature rupture of the chorioamniotic membranes: a randomized trial. Am J Clin Nutr 2005; 81:859-863.

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