

Maternal & Infant Nutrition Briefs



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



Breast-feeding Influences Later Child Feeding Style

Research suggests that breast-fed infants are largely in control of how much milk they consume. Some people have wondered whether breast-feeding during the first year of life has persistent effects on the degree of control mothers try to exert over feeding later on. This question is important because children of more controlling parents do not regulate energy intake as well and are fatter than children of less controlling parents. Thus, the purpose of this study was to determine whether breast-feeding during the first year of life influences toddler feeding practices and energy intake.

The subjects in this study were 55 well-educated, white mothers and their healthy infants, followed from 12 months to 18 months of age. Breast-feeding was defined as having nursed the infant for at least 12 months. When the children were 18 months old, the researchers used a questionnaire to assess degree of maternal control over feeding and trained the mothers to complete three-day dietary records for their children. Items in the questionnaire asked about the use of food as rewards, rules about finishing one's plate, coaxing children to eat, etc. Women who nursed their babies for at least 12 months reported exerting less control over their toddler's food intake than mothers who nursed less or not at all ($p < 0.01$). In turn, toddlers whose mothers exert less control, consumed more energy than children of controlling parents ($p < 0.01$). The degree to which mothers exert control over child feeding seems to explain why breast-feeding for 12 months was linked to higher energy intakes in toddlers.

This study is the first to suggest that breast-feeding during the first year of life might have beneficial effects on maternal feeding style and food intake in toddlers. However, while breast-feeding and later feeding style are associated, one cannot rule out the possibility that some unknown personality factors determine both the decision to breast-feed for 12 months

and toddler feeding practices.

Source: Fisher JO, Birch LL, Smiciklas-Wright H, Picciano MF. Breast-feeding through the first year predicts maternal control in feeding and subsequent toddler energy intakes J. Am. Diet. Assoc. 2000;100:641-646.

Bone Mineral Density after Many Pregnancies

Bone mineral density in premenopausal women is a major risk factor for fractures later in life. Through changes in the reproductive hormones, cycles of pregnancy and lactation may affect bone mineral density. A 5-6% loss of bone mineral density occurs after 6 months of breast-feeding but is recovered when women begin menstruating again. Most studies on bone mineral density have focused on one cycle of pregnancy or lactation only. This study examined the effects of multiple cycles of pregnancy and lactation on bone mineral density and risk of osteoporosis in a unique population of women.

The 30 mothers were Finnish-American members of the Laestadian Church in Washington, and consistent with their religious beliefs, do not use contraception. Thus, they had an average of 10 children (range: 6-17) and had breast-fed for an average of 84.5 months (range: 24-155) throughout their lifetimes. From the same church, six women who were, by choice, childless, were included as a comparison group. The groups did not differ in family or personal history of fractures. Body mass index of the two groups was similar, but the women with children were about 8 years older than the childless women. The researchers collected detailed information on pregnancy, breast-feeding, and medical history and measured bone mineral density of the radius, proximal femur, and lumbar spine using dual-energy x-ray absorptiometry. They also compared the bone mineral density values to a reference value for young adults to estimate the risk of osteoporosis. By this measure, a T-score < -2.5 indicates osteoporosis and a T-score of -1.0 to -2.5, osteopenia. Despite the differences in reproductive history, bone mineral density and T-scores did not differ among the two groups of women.

A better comparison group would have been women who had experienced one cycle of pregnancy and lactation, but apparently such a group could not be found from the same church. Although data on diet were not collected, all women who got married in the church took prenatal vitamins (fortunately). Also, the women are of Nordic descent and may have a cultural practice of consuming more dairy products than other populations. Moreover, a woman with 17 children is probably getting a lot of weight-bearing exercise. Thus, the authors believe the mothers were relatively fit and healthy. For this group of women with their lifestyles, multiple cycles of pregnancy and lactation do not appear to increase the risk of osteoporosis. The same may not hold true for other populations, with less healthy lifestyles or genetic tendency towards hormonal problems

Source: Henderson PH, Sowers M, Kutzko KE, and Jannausch ML. Bone mineral density in grand multiparous women with extended lactation. Am J Obstet Gynecol 2000; 182:1371-7.

Weight Gain during Pregnancy in Chinese Women

In 1990, the Institute of Medicine (IOM) released a set of guidelines recommending a prenatal weight gain of 11.5 to 16 kg for women of normal weight; 13-18 kg, for underweight women; and 6.8-11.5, for overweight or obese women. Since maternal size varies across populations, guidelines may need to vary too. This study was conducted with the aim of

making recommendations for weight gain in Chinese women.

The women in this study lived in Hong Kong, an urban area with a relatively low level of nutritional and social deprivation. All women delivering at a major hospital in Hong Kong over a 4-month period were included in the study. Since the women received prenatal care in government clinics, data were available on socioeconomic status, parity, mother's age, pre-pregnancy weight, medical history, date of last menstrual period, ultrasound assessment of fetal age, weight at each prenatal visit, and complications. Mother's weight before delivery, infant birth weight, and other outcome data came from the hospital records. A good pregnancy outcome was defined as: birth weight between 2500-4000 g; born at 37-42 weeks gestation; absence of prenatal complications; vaginal delivery; and live birth. Of the 908 women in the study, 504 had good pregnancy outcomes. To determine recommended weight gains for Chinese women, the researchers plotted the distribution of weight gains for women with good outcomes.

By Asian standards, more women were classified as overweight (14%) than by IOM standards (4%). Whether Asian or IOM standards are used to characterize pre-pregnant weight, the ranges of adequate weight gain differ for Chinese women, compared to the general IOM population (see table below). Chinese women who gained less than recommended amounts were 2.7 times as likely to deliver a low birth weight infant. Those who gained excessive amounts were 2.2 times more likely to have an assisted delivery. Risk of high birth weight was very low in this population and probably could not be reliably estimated in this study due to inadequate sample size. Although conducted in Hong Kong, this study has findings that may apply to Chinese women living in developed countries.

IOM BMI standards (kg/m ²)	IOM guidelines (kg)	Chinese weight gains by IOM standards (kg)	Asian BMI standards (kg/m ²)	Chinese weight gains by Asian standards (kg)
Underweight < 19	13-16.7	Underweight < 19	13-16.7	Underweight < 19
Normal 19.8-26	11.5-16	Normal 19.8-26	11.5-16	Normal 19.8-26
Overweight 26-29	11-16.4	Overweight 26-29	11-16.4	Overweight 26-29
or obese >29	6.8-11.5	or obese >29	6.8-11.5	or obese >29
	5.6-13.6		5.6-13.6	
	>23.5		7.1-14.4	

Source: Wong W, Tang NLS, Lau TK, Wong TW. A new recommendation for maternal weight gain in Chinese women. *J. Am. Diet. Assoc.* 2000; 100: 791-796.

Breast-feeding, Cow's Milk, and Later Risk of Diabetes

Few studies have been able to look at the long-term health benefits of breast-feeding. A recent study, using hospital records in Amsterdam from 1944-45, examined the association between infant feeding history and glucose and lipid metabolism, blood pressure, and body mass index in the same population measured 50 years later. From the hospital records, the researchers were able to classify 625 subjects at 10 days of age as exclusively breast-fed (83.2%) or partially/ exclusively bottle-fed (15.8%). Breast-fed infants were more likely to be males, born to younger mothers who suffered less from mastitis, and discharged earlier from the hospital than the bottle-fed group. Controlling for these differences, the researchers

found that adults who had been exclusively breast-fed had lower fasting and 120-minute blood sugar levels, lower LDL:HDL ratios, and higher HDL cholesterol levels than adults who had been bottle-fed. Body mass index and blood pressure did not differ among the two groups.

The researchers discount the possibility that exposure to famine may have affected both the decision to breast-feed and long-term cardiovascular disease risk, because 81% of women exposed to famine breast-fed exclusively compared to 83.2% of those not exposed to famine. However, in those days, babies were given bottles, if upon weighing after a feeding the nurses perceived insufficient milk supply. Also, adults who had been diagnosed with diabetes (3.5% of the eligible subjects) were excluded from the study.

Early infant feeding practices have been linked to both type 1 and type 2 diabetes. Type 1 diabetes involves an autoimmune process, resulting in destruction of the insulin-producing β -cells in the pancreas. From twin studies, scientists estimate that 30-40% of type 1 onset is due to genetic factors. That leaves between 60-70% due to environmental factors, including infections and diet. Several epidemiological studies have examined early exposure to cow's milk as a risk factor for type 1 diabetes. Most studies finding a link between cow's milk intake and diabetes have relied on long-term recall from mothers about infant feeding practices. Those studies that used existing records, which are more accurate, tend to find a weaker association between infant diet and later risk of diabetes. Only one study, carried out among the Pima Indians, reported higher risk of type 2 diabetes among adults who had been bottle-fed, compared to exclusively breast-fed as infants. As in the Amsterdam study, the authors point to overfeeding, rather than type of milk, as the reason why bottle-feeding may be associated with risk factors or diabetes later in life. Long-term intervention trials in susceptible populations are needed to confirm the association between early infant feeding and risk of chronic health problems in adults.

Sources: Ravelli ACJ, van der Meulen JHP, Osmond C, Barker DJP, Bleker OP. Infant feeding and adult glucose tolerance, lipid profile, blood pressure, and obesity. *Arch. Dis. Child.* 2000;82: 248-252.

Schrezenmeir J. and Jagla A. Milk and diabetes. *J. Am. Coll. Nutr.* 19 (2) 176S-190S.

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