

Three Daily Servings of Reduced-Fat Milk An Evidence-Based Recommendation?

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In light of research linking sugar-sweetened beverage consumption to obesity, the US Department of Agriculture, the American Academy of Pediatrics, and other organizations have formulated recommendations on healthy beverages. These guidelines consistently recommend limiting consumption of all calorie-containing liquids, except reduced-fat milk, of which people in most age groups are encouraged to consume 3 cups daily. This article questions the scientific rationale for promoting reduced-fat milk consumption at these levels in children and adults and reconsiders the role of cow's milk in human nutrition.

Limitations in the Evidence Base

Remarkably few randomized clinical trials have examined the effects of reduced-fat milk (0% to 2% fat content) compared with whole milk on weight gain or other health outcomes. Lacking high-quality interventional data, beverage guidelines presume that the lower calorie content of reduced-fat milk will decrease total calorie intake and excessive weight gain (Table). However, a primary focus on reducing fat intake does not facilitate weight loss compared with other dietary strategies, as shown in observational studies and clinical trials,^{1,2} perhaps because reduced-fat foods tend to have lower satiety value.

Suppose a child, who habitually consumes a cup of whole milk and two 60-kcal cookies for a snack, instead had nonfat milk. Energy intake with that snack would not decrease if that child felt less satiated and consequently ate just 1 extra cookie. Rather than weight loss, this substitution of refined starch and sugar (ie, high glycemic index carbohydrate) for fat might actually cause weight gain. Consumption of a low-fat, high glycemic index diet may not only increase hunger, but also adversely affect energy expenditure³ compared with diets with a higher proportion of fat. In an analysis of 3 major cohorts, high glycemic index carbohydrates, such as refined grains, sugary beverages, and sweet desserts, were positively associated with weight gain, whereas whole milk was not.⁴ Of particular relevance, prospective studies in young children,⁵ adolescents,⁶ and adults⁴ observed the same or greater rates of weight gain with consumption of reduced-fat compared with whole milk, suggesting that people compensate or overcompensate for the lower calorie content of reduced-fat milk by eating more of other foods.

Another rationale for recommending reduced-fat milk is to reduce intake of saturated fat (about 60% of milk fat) because this type of fat raises low-density lipoprotein cholesterol, a major risk factor for cardiovascular disease. Much evidence indicates that replacing saturated fat with polyunsaturated fat reduces heart disease

risk. However, when compared with carbohydrates, saturated fat increases cardioprotective high-density lipoprotein cholesterol, leaving the ratio of high-density lipoprotein to total cholesterol relatively unchanged. Consumption of high glycemic index carbohydrates also increases triglycerides, producing combined effects that appear to be worse than those of saturated fat.⁷ Thus, among 53 644 Danish adults followed up for 12 years, replacement of saturated fat with high glycemic index carbohydrates was associated with a significantly increased risk for myocardial infarction.⁸ Although replacement of saturated fat with unsaturated fat or with low glycemic index carbohydrates⁹ (eg, minimally processed grains, legumes, nonstarchy vegetables, and fruits) would reduce heart disease risk, such exchanges do not typify prevailing Western dietary patterns.⁷

Consumption of sugar-sweetened, flavored (eg, chocolate) milk warrants special attention. While limiting whole milk, some healthy beverage guidelines condone, and many schools provide, sugar-sweetened milk, with the aim of achieving recommended levels of total milk consumption in children. Not surprisingly, children prefer sweetened to unsweetened milk when given the choice, leading to a marked increase in the proportion of sweetened milk consumption in recent years. This trend may reflect, to some degree, compensation for the lower palatability and satiety value of fat-reduced milk. However, the substitution of sweetened reduced-fat milk for unsweetened whole milk—which lowers saturated fat by 3 g but increases sugar by 13 g per cup—clearly undermines diet quality, especially in a population with excessive sugar consumption.

The Role of Animal Milk in Human Nutrition

Humans have no nutritional requirement for animal milk, an evolutionarily recent addition to diet. Anatomically modern humans presumably achieved adequate nutrition for millennia before domestication of dairy animals, and many populations throughout the world today consume little or no milk for biological reasons (lactase deficiency), lack of availability, or cultural preferences. Adequate dietary calcium for bone health, often cited as the primary rationale for high intakes of milk, can be obtained from many other sources. Indeed, the recommended levels of calcium intake in the United States, based predominately on balance studies of 3 weeks or less, likely overestimate actual requirements⁹ and greatly exceed recommended intakes in the United Kingdom. Throughout the world, bone fracture rates tend to be lower in countries that do not consume milk compared with those that do. Moreover, milk consumption does not protect against fracture in adults, according to a recent meta-analysis.¹⁰

Table. Nutrient Content of Commonly Consumed Types of Milk Per 1-Cup Serving^a

Milk Type	Kcal	Total Fat, g	Saturated Fat, g	Sugar, g	Protein, g
Whole	149	7.9	4.6	12.3	7.7
2% fat	122	4.8	3.1	12.4	8.1
1% fat	102	2.4	1.5	12.7	8.2
Nonfat	83	0.2	0.1	12.5	8.3
1%, chocolate	178	2.5	1.5	24.9	8.1

^a Data from the US Department of Agriculture (<http://ndb.nal.usda.gov>).

Nevertheless, milk provides significant amounts of protein and other essential nutrients and may confer health benefits for children and adults with poor overall diet quality. For those with high-quality diets (including green leafy vegetables, legumes, nuts, seeds, and adequate protein), the nutritional benefits of high milk consumption may not outweigh the negative consequences.

Milk Intake and Cancer

Dairy milk evolved to promote the growth of grazing animals at high risk for predation when small. The consequences of lifetime human exposure to the growth factors in milk have not been well studied. Milk consumption increases serum concentrations of insulin-like growth factor 1, an anabolic hormone linked to prostate and other cancers. In addition, modern industrial methods maintain dairy cows in active milk production throughout successive pregnancies, resulting in a milk supply with high levels of reproductive hormones. Consumption of dairy products probably increases the likelihood or severity of prostate cancer, according to a report from the World Can-

cer Research Fund in 2007 (although the risk for colorectal cancer may be reduced).

Conclusions

The recommendation to replace whole milk with reduced-fat milk lacks an evidence basis for weight management or cardiovascular disease prevention and may cause harm if sugar or other high glycemic index carbohydrates are substituted for fat. The optimal level of milk consumption will likely vary among individuals, depending on overall diet quality. For those with low diet quality, calories removed by reducing the fat content of milk will likely be replaced by foods that increase the risk for obesity, diabetes mellitus, and heart disease; whereas for those with high diet quality, milk consumption may not improve health. Pending further randomized clinical trials and prospective observational studies, guidelines for milk or equivalent dairy products should (1) designate a broader acceptable range of intake, such as 0 to 2 or 3 cups per day, instead of a universal minimum requirement; (2) avoid recommending reduced-fat over whole milk; and (3) focus on limiting consumption of sugar-sweetened milk.

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