



DAIRY'S BENEFICIAL ROLE IN WOMEN'S HEALTH

SUMMARY

Women are at unique risk for various nutrition-related diseases and conditions because of their specific dietary needs. The U.S. Dietary Guidelines for Americans recommends 3 cups a day of fat-free or low-fat milk or equivalent milk products (i.e., yogurt, cheese). This advice is especially important for women. Women's low consumption of dairy foods reduces their intake of essential nutrients such as calcium and vitamin D and may contribute to their risk for various diseases or disorders that can affect the length and quality of their lives.

Among the 10 million Americans estimated to have osteoporosis, 80% are women. One in two women, compared to one in four men, over age 50 will eventually develop an osteoporosis-related fracture. Consuming a nutritionally balanced diet containing foods rich in calcium and vitamin D and regular weight-bearing exercise are major lifestyle strategies to help prevent osteoporosis. Numerous studies in women from young

adulthood to later years indicate that meeting age-appropriate recommendations for dairy foods or dairy food nutrients (e.g., calcium, vitamin D, protein) helps to maximize peak bone mass and reduce bone loss and the incidence of osteoporosis.

Many women are overweight or obese and engaged in weight loss efforts. Emerging scientific research indicates that intake of 3 servings/day of dairy products, such as milk, cheese, or yogurt, incorporated in a calorie-reduced diet may enhance the weight loss efforts of overweight or obese women.

Additional potential benefits of dairy foods for women have been reported. A diet rich in dairy foods or dairy food nutrients such as calcium and vitamin D may help alleviate symptoms of premenstrual syndrome. This disorder affects 8 to 20% of women of childbearing age. Also, intake of dairy foods and dairy food nutrients (e.g., calcium, potassium, magnesium, protein) has been linked to reduced risk of stroke in women. More women experience and die from a stroke than do men. Increased intakes of calcium, particularly from foods, and dairy products are associated with a lower prevalence of metabolic syndrome in women.

Increased intake of dietary calcium has been shown to be associated with reduced risk of developing kidney stones in women. Also, women who consume fermented dairy products such as yogurt and certain cheeses may lower their risk of urinary tract infections.

Consuming 3 servings of milk, cheese, or yogurt a day as part of a nutritionally balanced diet improves the nutrient quality of women's diets and contributes to their health. Also, by serving as role models (e.g., consuming dairy foods and making these foods readily available), women can positively influence children's dairy food intake and consequently their health. **D**



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INTRODUCTION

Women account for slightly more than half (51.1%) of the population in the United States (1). According to a recent position statement issued by the American Dietetic Association and Dietitians of Canada, women are at unique risk for various diet-related diseases and conditions because of their specific nutritional needs (2).

The diets of a high proportion of U.S. women aged 19 years and over provide lower than recommended amounts of essential nutrients such as calcium, magnesium, vitamins A, B₆, and K, and zinc (3). Only 12% of women consume calcium from food at levels greater than recommended (i.e., 1,000mg/day for 19-50 year old women and 1,200mg/day for those aged 51 and older) (3,4). Women's low calcium intake is attributed in large part to their low intake of milk and other dairy foods. Females 20 years of age and over consume only 1.4 servings of dairy foods a day (5) compared to the recommended 3 servings of milk, cheese, or yogurt a day (6).

Dairy foods are the major source of calcium and provide eight additional essential nutrients, including protein, potassium, phosphorus, vitamins A, D (if fortified), and B₁₂, riboflavin, and niacin (7-9). It is difficult to meet calcium needs when dairy products are reduced or eliminated from the diet (2,10,11). Because milk, cheese, and yogurt are naturally nutrient dense foods, their intake improves the overall nutritional quality of women's diets (8,12-14).

This *Digest* reviews recent research indicating that consuming recommended intakes of Milk Group foods or milk's nutrients (e.g., calcium) helps to reduce the risk of various diseases or disorders, many of which disproportionately or uniquely affect women (e.g., osteoporosis, obesity, stroke, premenstrual syndrome).

DAIRY AND DISEASES/ DISORDERS AFFECTING WOMEN

Osteoporosis. Osteoporosis is a major public health threat for an estimated 44 million Americans (15). In the United States, 10 million individuals over the age of 50 years are estimated to already have the

Health professionals should encourage women to consume 3 servings of fat-free or low-fat dairy products (i.e., milk, cheese, or yogurt) a day, which can improve the overall nutritional quality of their diets and help prevent diseases such as osteoporosis.



disease and almost 34 million have low bone mass, placing them at increased risk for osteoporosis (16). Of the 10 million Americans estimated to have osteoporosis, 80% are women (15). One in two women (one in four men) over age 50 will have an osteoporosis-related fracture within their lifetime.

To reduce the risk of osteoporosis, lifestyle changes, including intake of a nutritionally balanced diet containing foods rich in calcium and vitamin D (e.g., dairy foods such as milk, cheese, and yogurt) and regular exercise (particularly weight-bearing or resistance exercise) are recommended (2,6,15,16). Calcium and vitamin D are the nutrients most important for bone health (2,16). Unfortunately, many women fail to consume sufficient amounts of these nutrients (3).

Numerous studies in women indicate that increasing consumption of dairy foods or dairy food nutrients (e.g., calcium, vitamin D, protein) helps to maximize peak bone mass and reduce bone loss and the incidence of osteoporosis (17-24). Researchers recently found that hip and spine bone loss associated with oral contraceptive use was reduced in women using oral contraceptives who consumed dairy products containing at least 1,000mg of calcium per day (18). Use of oral contraceptives without adequate calcium intake may prevent young women from reaching peak bone mass and increase their risk of osteoporosis in later life. In this one-year study, 154 women aged 18 to 30 years (oral contraceptive users and non-users) with low dietary calcium intakes (<800mg/day) were randomized to one of three diet intervention groups: control (<800mg calcium/day), medium dairy (1,000 to 1,100mg calcium/day), or high dairy (1,200 to 1,300mg calcium/day) (18). At the end of the year, women consuming the medium or high dairy diets had significantly higher bone mineral density in their hips and spines compared to the low dairy group. Oral contraceptive users consuming low calcium diets lost bone at both spine and hip sites compared to non-users, but this loss was prevented with the medium or high dairy intakes (18). Findings of this study suggest that women taking oral contraceptives should consume

dairy products at levels necessary to achieve recommended intakes of calcium to optimize their bone health (18).

In a cross-sectional study of 108 Japanese female nursing students aged 19 to 25 years, low calcium intake and mild hyperparathyroidism (partly explained by low vitamin D nutrition and low calcium and protein intakes) were identified as important independent predictors of low bone mineral density (21). In another cross-sectional study of 963 Norwegian women aged 19 to 35 years, low milk intake was associated with low forearm bone mineral density, whereas milk drinkers had significantly higher bone mineral density at the wrist and forearm (22).

A meta-analysis of 15 randomized controlled trials of the effect of calcium for the prevention of postmenopausal osteoporosis found that increasing calcium intake reduced bone loss by approximately 2% after two or more years and led to a significant (~23%) reduction in the risk of spine fractures (20).

In 29 postmenopausal women whose diets were typically low in calcium (<600mg/day), intake of three servings/day of fruit-flavored yogurt instead of a non-nutritious sweet snack for seven to ten days significantly reduced a urinary marker (i.e., N-telopeptide) for bone resorption (14). The addition of yogurt to the diet also improved the nutrient quality of the women's diets (14). Studies in Chinese postmenopausal women have demonstrated that age-related bone loss is reduced and bone mineral density is increased in those who increased their milk intake (23,24).

In addition to calcium, other nutrients in dairy foods such as vitamin D and protein are also important for bone health. Adequate vitamin D status is essential to maximize skeletal health throughout life (4,16,25). Vitamin D can be obtained through synthesis in the skin following exposure to sunlight and by consuming vitamin D-containing foods such as vitamin D-fortified dairy foods (e.g., milk, some cheeses and yogurts). Few foods are naturally rich in vitamin D. For this reason, virtually all milk in the U.S. is voluntarily fortified with vitamin D to a level of 100 I.U. per one cup serving (4).



Emerging science indicates that overweight or obese women may enhance their weight loss efforts by consuming 3 servings of milk, cheese, or yogurt a day incorporated in a calorie-reduced weight loss diet.

Recent findings from national surveys reveal that many women fail to consume sufficient vitamin D and/or have poor vitamin D status (26,27). One study reported that females aged 14 to 50 years were about half as likely as their male counterparts to meet vitamin D recommendations from food sources (26). This study found that the dairy group was the largest food source of calcium and vitamin D (26).

Poor vitamin D status results in decreased intestinal calcium absorption and can lead to secondary hyperparathyroidism, increased bone loss, osteomalacia, and increased risk of fractures (4). A meta-analysis of 25 randomized controlled trials of vitamin D and bone density and fractures in postmenopausal women found that vitamin D decreased vertebral and possibly non-vertebral fractures (28). Increased intake of calcium and vitamin D has been shown to be effective in reducing bone loss, fracture incidence, and falls in older women (21,29-31).

Protein is another nutrient in dairy foods that favorably affects bone health and helps to prevent osteoporosis, particularly in women who meet their calcium and vitamin D requirements (32,33). Several epidemiological studies in women demonstrate a positive association between protein intake and bone health (34-37). In a cross-sectional study of 489 postmenopausal women, higher bone mineral density in the spine, midradius, and total body was found in those who consumed a high protein diet (72 grams/day or 20% of calories) and at least 400mg calcium/day compared to women who consumed diets lower in protein (37). Other nutrients in dairy foods such as phosphorus and potassium have been demonstrated to improve bone health in women (38,39).

A report from the North American Menopause Society (NAMS) emphasizes the important role of calcium both before and after menopause to reduce the risk of diseases such as osteoporosis (40). The NAMS states that dairy products are among the best sources of calcium due to their high calcium content, high calcium bioavailability, and low cost relative to their total nutritional value (40). Dairy foods are also important sources of other key nutrients for bone

health such as vitamin D, protein, phosphorus, and potassium (7-9).

Overweight and Obesity. Among U.S. women aged 20 years and over, 61.1% are overweight or obese (41). Overweight and obesity are associated with a number of diseases affecting women such as heart disease, type 2 diabetes, and some cancers (e.g., endometrial, colon, postmenopausal breast) (42).

More women (43.6%) than men (28.8%) attempt to lose weight (42). Unfortunately, many women trying to lose weight fail to follow the recommended strategy of reducing calorie intakes and increasing physical activity (43). Evidence indicates that eliminating certain food groups (e.g., dairy foods) from the diet in an effort to lose weight may be harmful to women's health and counterproductive to their weight loss efforts. Because weight loss or calorie restriction is associated with adverse effects on bone health, higher calcium intakes than currently recommended may be needed for overweight women on calorie-reduced diets to protect their bones (44,45).

Emerging scientific research indicates that overweight or obese women may be able to enhance their weight loss efforts by consuming 3 servings of dairy products such as milk, cheese, or yogurt each day as part of a reduced calorie weight loss diet (46-49). In young adult women ages 18 to 31 years enrolled in a two-year exercise program, calcium from dairy foods was associated with lower body weight and body fat in those consuming fewer than 1,900 calories per day, but not in those whose intake of calories was higher (46). In this study, higher calorie intakes appeared to obscure any beneficial effect of calcium on body weight. In a reevaluation of five clinical studies originally designed to measure bone health and including 780 women, researchers found that a higher intake of calcium, particularly from dairy foods, was associated with a lower body mass index and body weight (48). In a subsequent reevaluation of the same data, it was estimated that increasing calcium intakes to recommended

Although more research is needed, intake of recommended daily servings of dairy foods may help women reduce their risk of premenstrual syndrome, stroke, metabolic syndrome, kidney stones, and other diseases or disorders.



levels may reduce the prevalence of overweight and obesity in women by 60 to 80% (49).

As reviewed in a previous Digest (50), several randomized clinical trials which included overweight or obese women following reduced calorie diets (i.e., 500 calorie deficit) demonstrated that increasing consumption of dairy foods (i.e., milk, cheese, and/or yogurt) to 3 servings/day enhanced body weight and body fat losses, reduced central (trunk) obesity, and minimized loss of lean body tissue compared to the same degree of energy restriction while consuming little or no dairy. Consuming 3 servings of dairy foods a day may also help improve body composition during weight maintenance (51). It is important to note that the beneficial effect of dietary calcium or dairy product intake on body weight or body fat appears to occur only under specific circumstances such as reduced calorie intake, or only for specific individuals such as those who are obese or overweight (52).

Among the several mechanisms suggested to explain dairy's beneficial effect on body fat metabolism is the ability of dietary calcium to increase fat oxidation (53). In a recent clinical trial in 19 normal weight women ages 18 to 30 years, researchers found that women who consumed 3 servings of dairy foods each day over the course of a year burned more fat and calories from a meal than did women who consumed a low calcium (<800mg/day or 1 to 2 servings of dairy/day) diet (53).

Premenstrual Syndrome. A diet rich in dairy foods or dairy food nutrients may be beneficial in alleviating symptoms and preventing premenstrual syndrome (PMS), a condition occurring in about 8% to 20% of women of childbearing age (54). Results of clinical trials indicate that increasing calcium intake by about 1,000 mg to 1,300 mg/day substantially alleviates PMS symptoms (55-58). Further, studies show that intake of milk, cheese, and yogurt is associated with fewer PMS symptoms (55,56,59). In addition to reducing PMS symptoms, calcium and vitamin D in foods may help prevent PMS from developing in the

first place (54). In a recent case-control investigation, researchers compared the diets and supplement use of 1,057 women aged 27 to 44 years who reported developing PMS over the course of 10 years with that in 1,968 women who reported no or minimal PMS symptoms during the same period (54). High calcium and vitamin D intake from food (but not supplements) – equivalent to about 4 servings of fat-free or low-fat milk or low-fat yogurt – was associated with a significantly lower risk of PMS compared to intake of one serving or less a day (54).

Stroke. Each year, about 40,000 more women than men experience a stroke (a type of cardiovascular disease), and more than 60% of total stroke deaths occur in women (60). Intake of dairy foods and dairy food nutrients (e.g., calcium, potassium, magnesium, protein) has been linked to reduced risk of stroke (61-64). High intakes of dietary calcium were associated with a lower risk of ischemic stroke in the Nurses' Health Study of more than 85,000 women aged 34 to 59 years (62). The inverse association between calcium intake and stroke was almost three times stronger for dairy than for nondairy sources of calcium (62). A recent prospective study in Japanese women found that calcium intake from dairy products (milk, yogurt, cheese) was associated with reduced risk of mortality from stroke (64).

Metabolic Syndrome. Metabolic syndrome, a risk factor for coronary heart disease and type 2 diabetes, is a clustering of three or more of the following metabolic abnormalities: abnormal lipid profiles, high blood pressure, obesity, and abnormal glucose metabolism. An analysis of data from more than 10,000 middle-aged and older U.S. women participating in the Women's Health Study found that higher intakes of calcium (total, dietary, supplemental) and dairy products were associated with a lower prevalence of metabolic syndrome (65). The highest versus the lowest calcium intake from foods was associated with a lower prevalence of metabolic syndrome than calcium from supplements (65). Also, in overweight

Women can be positive role models for their families by consuming milk and other dairy foods themselves and by making these foods readily available at meals and as snacks.



younger women aged 18 to 30 years, increased dairy consumption was shown to be associated with reduced incidence of metabolic syndrome (66).

Other Potential Benefits.

Consuming dairy products has additional potential benefits for women. A high intake of calcium-rich foods may reduce women's risk of developing kidney stones (67,68). According to an eight-year prospective study of more than 96,000 women aged 27 to 44 years participating in the Nurses' Health Study II, women with the highest (1,129 mg/day or more) versus lowest (626 mg/day or less) intakes of dietary calcium had a significantly reduced risk for kidney stones (67). In contrast to dietary calcium, supplemental calcium intake was associated with increased risk of kidney stones. The researchers speculate that high dietary calcium inhibits the intestinal absorption and urinary excretion of oxalate, thus decreasing the formation of calcium oxalate stones, the most common type (67).

Fermented dairy products or dairy products containing probiotics (i.e., live microorganisms that confer a health benefit) may help protect against urinary tract infections in women, according to a case-control study that evaluated dietary and other risk factors for urinary tract infections (69). Women who consumed fermented milk products such as yogurt and certain cheeses three or more times a week had a 79% lower incidence of urinary tract infections compared to those who ate these dairy foods once a week or less (69).

CONCLUSION

Consuming recommended intakes of dairy foods improves women's nutrient intake and may reduce their risk for several chronic diseases and other conditions. By making dairy foods readily available at family mealtimes and as snacks and consuming these foods themselves, women can play a positive role in shaping children's dietary habits, including their intake of dairy products (70-72). A five-year prospective study of 192 mothers and their young daughters

found that mothers' consumption of milk and how frequently they made milk available to their daughters at meals and snacks was positively related to their daughters' milk consumption, calcium intake, and bone health (72). USDA's MyPyramid "Steps to a Healthier You" (www.mypyramid.gov) provides information and tools to help women make healthier food and physical activity choices. **D**

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