Calcium and Vitamin D Supplementation Has Little Effect on Postmenopausal Weight Gain

Caan B, Neuhouser M, Aragaki A, et al. Calcium plus vitamin D supplementation and the risk of postmenopausal weight gain. Arch Intern Med 2007;167:893–902.

Study Overview

Objective. To determine the effect of calcium plus vitamin D supplementation on weight gain in postmenopausal women.

Design. Randomized, double-blind, placebo-controlled trial.

Setting and participants. Study participants were 36,282 women previously enrolled in the Women's Health Initiative (WHI), a large clinical trial designed to assess the effects of hormone therapy and dietary modification in postmenopausal women aged 50 to 79 years. One year after enrollment, the women were recruited into a substudy designed to test the effect of calcium plus vitamin D on risk for hip fracture and colorectal cancer. During the course of the study, personal use of calcium (up to 100 mg/day) and vitamin D (up to 600 IU/day) was allowed.

Intervention. Study participants were randomized to receive 1000 mg of elemental calcium plus 400 IU of vitamin D (cholecalciferol) or matching placebo daily.

Main outcome measures. The primary outcome was change in body weight. Weight measurements were collected annually through 7 years of follow-up.

Main results. 18,176 women received supplements, and 18,106 received placebo. Baseline characteristics were similar between the 2 groups. At baseline, 54% of women noted personal use of calcium supplementation, and 39.6% met the recommended daily allowance of 1200 mg/day of calcium (diet plus supplements). The overall mean difference in weight gain between the calcium plus vitamin D group and the placebo group was –0.13 kg (95% confidence interval [CI], –0.21 to –0.05; $P = 0.001$), with most of the benefit seen in women with low (< 1200 mg/day) baseline calcium intake (mean difference, –0.19 [95% CI, –0.29 to –0.09]; $P = 0.09$). After 3 years, women randomized to supplements who initially had calcium intakes below the recommended daily allowance of 1200 mg/day had a 11% reduced risk of small (1–3 kg) as well as moderate (> 3 kg) weight gain when compared with women randomized to placebo ($P = 0.008$). This peak effect at 3 years persisted through the remaining 4 years of follow-up.

Conclusion. Calcium plus vitamin D supplementation appears to reduce the risk of weight gain in postmenopausal women, but the effect is small. Women with low intake of calcium may experience the greatest benefit from supplementation.

Commentary

Weight gain is common for postmenopausal women, and effective strategies to minimize weight gain in this population are needed to prevent the clinical consequences associated with obesity [1]. Calcium intake is hypothesized to have an effect on weight gain through either its effect on lipid homeostasis or fat absorption; however, data from clinical studies

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have been inconsistent [2,3]. Much of this inconsistency may be associated with small study design or limited trial duration. The randomized WHI study by contrast had a sample size of 36,282 patients, andcalcium intake was associated with a statistically significant albeit small effect on weight gain. To put this outcome into clinical context, the reduction in weight gain would translate into roughly a third of a pound after 7 years. This degree of weight loss is unlikely to have much of an effect on obesity-associated outcomes such as diabetes or hypertension.

The study has several limitations, the most concerning of which is the significant crossover that occurred during the trial. At study conception, the WHI investigators believed it would be unethical to deny women the chance to take calcium supplementation on their own. As a result, almost 60% of women allocated to the control arm reported taking calcium supplements, with approximately 40% taking more than 1200 mg per day. Even in a large trial such as the WHI, this amount of contamination could seriously bias the results toward the null. Additionally, more than a third of the participants were taking less than 50% of their allocated medications by year 7. Finally, the calcium supplementation used in this study was from nondairy sources, and some past studies have suggested that it may be calcium from dairy sources that offers a weight-protective effect.

Applications for Clinical Practice

In postmenopausal women, supplementation with calcium and vitamin D is unlikely to result in a clinically significant reduction in weight gain. However, calcium and vitamin D supplementation should continue to be recommended for bone health in postmenopausal women.

—Review by Harvey J. Murff, MD, MPH

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