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## **Walking - backmending exercise for women - study on the effects of exercise and nutrition on bones of older women**

Judy McBride

### Walking--Backmending Exercise for Women

Pat Phillipps knows Beacon Hill like the back of her hand. Hundreds of times in the course of a year she climbed the hill and walked the loop surrounding the Boston Common with 17 other women.

Phillipps was 1 of 36 women who completed a year-long study designed by physiologists at the ARS Human Nutrition Research Center on Aging at Tufts University just a few blocks away.

The researchers hoped to establish whether or not a regular routine of aerobic exercise--in this case, brisk walking four times a week--and/or a diet containing more calcium than currently recommended could help stem bone loss in women past menopause.

Numerous studies have examined how exercise, calcium, or both affect bone density in women. But the findings are inconsistent, says study leader Miriam E. Nelson, noting that earlier studies did not measure as many bone sites as this one. "We targeted the major places where osteoporosis causes breaks--the spine, hip, and wrist--plus we measured total body calcium."

According to a 1984 report by the American Academy of Orthopedic Surgeons, one-third of women over 65 will have one or more fractures of spinal vertebrae. And as women survive into their eighties, one-third will experience hip fractures. In 1987, the National Osteoporosis Foundation estimated that 1.3 million Americans 45 years and older suffer bone fractures each year costing between 7 and 10 billion dollars annually.

"Poor bone health is an increasingly common medical, social, and economic problem," says Nelson. "Its prevention or amelioration is of major importance for maintenance of health in the elderly." So Phillipps and her 17 walking partners--all of them relatively sedentary before the study--huffed and puffed around the Common and adjacent public gardens at 75 to 80 percent of their maximum aerobic capacity for about 50 minutes a day 4 days a week. Nelson served as their drill sergeant on most of the walks, making sure no one slacked off.

After a month of easing into the regimen, Phillipps says, the women wore weight belts to increase the load being carried by the skeleton. And they periodically wore heart rate monitors to ensure that heart rates stayed up to speed. "As you get more fit, your pulse gets slower and you have to walk faster to keep it up," she notes.

Meanwhile, 18 other women of similar age--the average was 60--and fitness level maintained their sedentary lifestyles for comparison.

Half of the women in each group consumed a milkshake-like drink containing an extra 800 milligrams of calcium over and above the 800 mg they were already consuming in their normal diet. The other half got a shake containing only a trace of calcium so researchers could check the effects of extra calcium with and without exercise.

Both the walking and the extra calcium paid off, but in different bones, says Nelson. While the sedentary women lost an average 7 percent of spine bone during the year, the walkers increased spine bone by a slight 0.5 percent. The changes were in the spongy bone, or trabecular bone, which constitutes the center of the vertebra. Sixty percent of the vertebral bone is trabecular. There did not seem to be any change in the denser cortical bone covering each vertebra, Nelson says.

That's important news, according to William J. Evans, who heads physiology research at the Boston center. "Once you lose trabecular bone, it doesn't appear you can gain it back to any significant extent. So the strategy has to be to try to arrest the loss."

Getting extra calcium, on the other hand, increased the bone density of the hip, says Nelson. And its effect in the nonwalkers was the same as in the walkers. The improved bone health was probably in both trabecular and cortical bone; the researchers did not measure the two types independently.

Regardless of activity level, says Nelson, the women who got the high calcium drink gained an average 2 percent in bone density at the hip, while those who got the placebo shake lost 1.1 percent.

The bone under study was not part of the pelvic girdle but rather the neck of the thigh bone (femur) which fits up into the hip socket. "A very high percentage of breakages occur here," Nelson explains. Nelson concludes that "exercise and extra calcium appear to have different effects at varying sites of the skeleton." So it looks like women need to walk and drink calcium at the same time to get the total benefit. "It really should be a lifelong change in diet and exercise," says Nelson, not a stopgap measure after menopause.

The fact that exercise appears to have a greater effect on spine trabecular bone than calcium has on hip cortical bone has a logical explanation, says Evans. All bone is continually being broken down and replaced throughout life. "But trabecular bone turns over six to seven times faster than cortical bone, so you're likely to see an effect faster."

The fact that extra calcium didn't enhance the effects of exercise, however, was somewhat of a surprise. "We thought there might be a synergistic effect," says Evans, because some reports had speculated post-menopausal women need about 1,200 mg/day to replenish calcium losses.

Nelson points out that the calcium for this study was "au naturel," unlike other studies that used calcium supplements. The 16-ounce shake contained enough milk and milk powder to provide an extra 800 mg. A very low calcium lookalike, taste-alike placebo drink was developed for the other women.

There were a few women in the high-calcium shake group who had problems digesting the lactose contained in the drink. These few women simply split up the 16-ounce milk shake into four servings throughout the day--"and they tolerated the lactose very well," she says.

Neither the extra calcium nor the walking had any effect on the wrist bone--which is mostly cortical bone--or on the total body calcium level, Nelson says.

Her findings were published in the May issue of American Journal of Clinical Nutrition.

But brisk walking provided a side benefit. The walkers improved their aerobic capacity--also known as [VO.sub.2] max--an average 8.8 percent over the course of the study while the sitters lost 7.5 percent.

After a couple of months on the Beacon Hill circuit, "when I got used to walking, I noticed a great change," says Phillipps. "You'd think it would tire you out, but it didn't. It had the opposite effect--I felt invigorated. I also ate a smaller lunch. Walking abated my appetite a little."

PHOTO : In studies conducted by ARS researchers at the Human Nutrition Research Center on Aging at Tufts University, volunteers walk briskly around the Boston Common.

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