

Lifestyle Modifications May Help Avoid Need for Pharmacological Management of Osteoporosis

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Osteoporosis affects more than half the population aged >55 years, and the prevalence increases with age; by age 80 years, approximately 75% of people will have the condition. Osteoporosis and falls increase the risk of fracture, leading to substantial morbidity and mortality. Approximately 90% of hip fractures are due to a fall, and the National Osteoporosis Foundation estimates that nearly 25% of people with a hip fracture die within the first year after the fracture. In addition, all fragility fractures are associated with increased mortality, and signal an increased risk of other fragility fractures.

Given this high morbidity and mortality, effective strategies for preventing and managing osteoporosis are essential. Clinicians may reduce the need for pharmacological treatment of osteoporosis by helping their patients modify lifestyle behaviors.

“It’s worth our effort to work with patients to help them understand and reduce risk,” said Suzanne M. Jan De Beur, MD, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA. “Making lifestyle modifications not only improves the risk of fracture but also helps individuals realize other health benefits,” she added.

Smoking

Several studies have linked smoking with an increased risk for fractures; the risk is higher for both men and women, and the risk for hip fractures appears to be higher among women. Studies have also shown lower bone mineral density (BMD) in current smokers. There is gradation in the risk that is associated with smoking with the lowest risk for never-smokers, a greater risk for past smokers, and the greatest risk for current smokers.

Using the World Health Organization (WHO) Fracture Risk Assessment Tool (Frax; <http://www.shef.ac.uk/FRAX/>) to illustrate the effect of smoking, Dr. Jan de Beur calculated the fracture risk for a 65-year-old man with and without a history of smoking. Smoking increased the risk of hip fracture from 2.6 (a score below the treatment threshold) to 4.1 (a score above the treatment threshold). The increase in risk that was caused by smoking is equivalent to 10 years of aging.

Alcohol

Alcohol is another factor that increases the risk of osteoporosis and fractures. High alcohol consumption (defined as more than 2 drinks per day) has been associated with lower BMD and osteoporotic fractures among both men and women, although there is variation according to gender and type of alcoholic beverage.

Using the same case scenario as with smoking, Dr. Jan de Beur showed that according to FRAX, 3 or more units of alcohol per day increases the risk of hip fracture from 2.6 to 3.9, again moving from below the treatment threshold to above it. The combination of smoking and high alcohol intake increased the risk of hip fracture to 6.2.

There may be a benefit to moderate alcohol consumption, however. Several studies have shown that 1 or 2 alcoholic drinks per day was associated with a higher BMD among older women, but the evidence has been insufficient for women aged 40 to 60 years and has been inconsistent for men.



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Caffeine

Unlike smoking and alcohol consumption, caffeine is not an established risk factor for osteoporosis, and there is no caffeine history question on FRAX. However, it is good clinical practice to ask patients about their caffeine intake as part of an overall assessment of osteoporosis risk. Some evidence suggests that the effects of caffeine are more pronounced with low calcium intake. For example, a modest increase in fracture risk was found with a daily intake of 330 mg of caffeine (1 cup of coffee contains 90 to 150 mg of caffeine; HR, 1.20; 95% CI, 1.07 to 1.23) among women (aged 40 to 76 years) with a low calcium intake [Hallström H et al. *Osteoporos Int* 2006]. Intake of calcium-rich foods may offset the effects of caffeine.

Other studies have shown that the risk for hip fracture increases with an increasing amount of caffeine, and the effect appears to be greater among older individuals. However, several cohort and case-control studies have not demonstrated an association. Few studies have been done to evaluate the effect of cola, which typically contains 30 to 45 mg of caffeine, but in the Framingham Osteoporosis Study, BMD (at the hip) decreased as daily cola consumption increased but only among women [Tucker KL et al. *Am J Clin Nutr* 2006].

In summary, Dr. Jan de Beur advised a common sense approach to nonpharmacological interventions for the prevention of osteoporosis (Table 1).

Table 1. Nonpharmacological Approach to Preventing Osteoporosis.

<p>Insist on smoking cessation</p> <ul style="list-style-type: none"> • Limit alcohol intake to 2 units daily (may encourage 1 glass of red wine) • Promote moderate intake of caffeine (no more than 2 cups of coffee [or about 200 mg of caffeine]) • Encourage weight-bearing physical activity and fall prevention measures • Reinforce adequate calcium and vitamin D consumption
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Physical Activity and Fall Prevention

With regard to bone health, regular physical activity has an effect on bone strength, helps to maintain bone mass, and may reduce the risk of falls. Clinicians should target efforts to increase physical activity among patients who are aged ≥ 80 years, as the rates of hip fracture are highest for this age group, said Wendolyn S. Gozansky, MD, Institute for Health Research, Kaiser Permanente Colorado, Arvada, Colorado, USA.

The American College of Sports Medicine (ACSM) provides guidance on physical activities for older individuals (Table 2) [Nelson ME et al. *Med Sci Sports Exerc* 2007]. The studies indicate that the osteogenic effects of moderate-intensity exercise can be maximized by integrating short bouts of high-intensity exercise. Short but frequent exercise is better for bone health. For example, 10 minutes of brisk walking 5 days a week is more beneficial than 50 minutes of brisk walking on 1 day.

Table 2. ACSM Recommendations for Physical Activity in Older Individuals.

<ul style="list-style-type: none"> • Engage in moderate intensity aerobic (endurance) activities (such as walking) 3 to 5 times/week for at least 30 minutes. Integrate short bouts of jogging or increased walking speed • Add resistance exercises 2 to 3 times/week • Integrate exercises to improve balance and strength <p>Nelson ME et al. <i>Med Sci Sports Exerc</i> 2007.</p>

Activities that promote balance and strength are also important for older individuals because of the high risk for falls in this population; one-third of community dwellers aged ≥ 65 years fall each year, and the rate is higher among older individuals in institutions. Among the strongest risk factors for falling are a prior fall; impairment of strength, gait, and balance; and some medications.

It is not only the number of medications but also the types of medications. Pain medications and antihypertensive agents are two types of drugs that increase the risk of falls and fall-associated fractures. “Any medication that affects cognition, balance, and awareness are dangerous in our older folks,” Dr. Gozansky added.

About 50% of older individuals have a fear of falling, and this is a major issue. The fear of falling leads a person to be less active, which leads to a person being more likely to fall, which creates a greater fear of falling. “It’s a vicious cycle,” said Dr. Gozansky.

Dr. Gozansky encouraged clinicians to “ask, assess, and act” as a way of paying greater attention to the risk of falls among their older patients (Table 3). Recommending exercise on a prescription pad can make an enormous difference in terms of patient adherence.

Table 3. “Ask, Assess, and Act” for the Prevention of Falls.

Ask	<ul style="list-style-type: none"> • Have you fallen in the past year? • Are you concerned about falling? • Do you avoid certain activities due to concerns about falling?
Assess	Perform a timed (or untimed) get-up-and-go test
Act	Prescribe exercise, refer to physical therapy, suggest a home safety evaluation, minimize medications

Calcium and Vitamin D

Calcium and vitamin D supplementation has long been recommended as a strategy to prevent osteoporosis and decrease the risk of fractures. But, many questions remain about how much of each is required and whether insufficient or deficient intake affects bone health, according to John A. Eisman, MB BS, PhD, FRACP, Garvan Institute of Medical Research, Sydney, Australia.

Calcium in bone mineral is a crucial component for bone strength. Vitamin D is essential for normal calcium homeostasis and also modulates the risk of fracture by preventing falls and increasing bone density. In a meta-analysis of studies that involved individuals aged ≥65 years, prevention of nonvertebral fractures with vitamin D was dose-dependent, with higher doses estimated to reduce fractures by around 20% [Bischoff-Ferrari HA et al. *Arch Intern Med.* 2009].

The best available clinical indicator of vitamin D status is serum 25-hydroxyvitamin D (25-OH D), but the level is influenced by vitamin D intake as well as sun exposure, and the optimal level has been difficult to define. Levels of 25-OH D <27.5 nmol/L (11 ng/ml) and <37.5 nmol/L (15 ng/ml) have been considered to be deficient and insufficient, respectively. However, 75 nmol/L (30 ng/ml) was recommended as a minimum threshold to maintain skeletal health on the basis of the lack of osteoid on biopsy specimens from the iliac crest at autopsy [Priemel M et al. *J Bone Miner Res* 2010].

Two recent reports have made important statements about calcium and vitamin D. In 2010, an International Osteoporosis Foundation (IOF) position statement provided key evidence-based recommendations about vitamin D. The IOF estimated that for older adults, the average vitamin D requirement is 800 to 1000 IU/day, with an increase of up to 2000 IU/day for individuals who are obese and have osteoporosis or limited sun exposure [Dawson-Huges B et al. *Osteoporos Int* 2010].

An Institute of Medicine report that was published in early 2011 stated that evidence supports the key role of calcium and vitamin D in skeletal health and provided updated recommended daily allowances of calcium and vitamin D for bone health (Table 4) [Ross AC et al. *JCEM* 2011]. The Committee concluded that the prevalence of vitamin D inadequacy in North America has been overestimated and recommended reassessment of laboratory ranges for 25-OH D to avoid problems of undertreatment and overtreatment.

Dr. Eisman made his own “prudent suggestions” for calcium intake and 25-OH D levels for the prevention of

osteoporosis. For both women and men, he suggested that optimal calcium intake should be approximately 1000 mg/day. He said that calcium supplements should be taken with meals to minimize peaks in serum calcium levels. He also noted that a total 25-OH D level (D₂ plus D₃) of approximately 75 nmol/L (30 ng/ml) was “reasonable, bone protective, and likely safe.”

Table 4. 2011 Recommended Daily Allowances of Calcium and Vitamin D for Bone Health.

Calcium intake	700–1300 mg/day
Vitamin D intake	600 IU/day (1 to 70 years); 800 IU/day (≥71 years)
Corresponding 25-OH D*	At least 50 nmol/L (20 ng/ml)

*Higher values were not consistently associated with greater benefit. Ross AC et al. *JCEM* 2011.

