Alcohol and recommendations for bone health: should we still exercise caution?1,2

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The beneficial association between moderate drinking of alcohol and bone health is consistent across many studies. However, public health guidelines need to be tempered because of the severe problems caused by excessive alcohol consumption. There are abundant data to show that too much alcohol is detrimental to health, including bone health, and a J-shape or U-shape relation explains the association between alcohol intake and other chronic diseases (1). In this issue of the Journal, Tucker et al (2) analyzed the type of alcohol consumed by their cohort of men and women, as assessed by a semiquantitative food-frequency questionnaire (FFQ) and showed that, at least for men, it may be the constituents other than ethanol that are important. They addressed the potential confounding effect of past drinking and provide insights into why beer drinking may be beneficial for bone health in men.

Alcohol stands out as an anomaly in the nutrition world. It is a source of dietary energy; however, most guidelines for macronutrient intake focus only on food energy, although alcohol can contribute 5% total energy intake. Alcohol consumption crosses social divisions in the United Kingdom, with both the affluent and more deprived classes imbibing similar quantities, although those receiving government benefits report less alcohol consumption (3). In the United States, more affluent individuals report higher consumption and 45% of Americans do not drink any alcohol (4). The consumption of alcohol is surrounded by taboo, forbidden by some religions, and influenced by recent historical events. For some countries, or for some religious and ethnic groups within individual countries, it would be inappropriate for a woman to be seen drinking any alcohol. There are clear sex differences in the type of alcohol drunk as observed by Tucker et al: men consume predominantly beer, whereas women consume mostly wine. Although the Western diet on both sides of the Atlantic has similar characteristics, the pattern of alcoholic beverage consumption may be quite different, especially across different age ranges and regions. In the United Kingdom, “alcoops” and cider are characteristic beverages of a younger age group, whereas fortified wines such as sherry or port are seen as an older person’s drink. Nevertheless, the associations of moderate alcohol drinking and bone health are also seen in early postmenopausal Scottish women, with 1–2 alcoholic drinks/d being associated with less bone loss (5). Those who drink alcohol in moderation may have healthier lifestyles and this may found the relation between bone health and alcohol intake (6). However, this does not explain why for postmenopausal women there is a consistent dose-response relation.

Beer contains silicon (7), small quantities of B vitamins (8), and bioactive polyphenols. Silicon has been reported to be essential for bone growth, and B-complex vitamins (vitamin B-6, vitamin B-12, and folate) are known to reduce circulating homocysteine, which has been associated with increased fracture risk. Wine, particularly red wine, contains a range of phytochemicals, many of which could plausibly influence bone metabolism, including resveratrol, which has estrogenic activity (9). White wine contains fewer bioactive components than red wine, but consumption of different wine types was not given in the Tucker et al study. If nonalcoholic constituents explain the positive associations between bone health and alcohol consumption, it can be argued that they can be obtained from other sources besides alcoholic drinks. The possible estrogenic effect of alcohol in relation to bone deserves further consideration in women. There is recent evidence that estradiol attenuates the effects of ethanol in osteoblasts but that ethanol impairs estrogen receptor signaling (10).

For postmenopausal women, the benefits of alcohol were seen in women consuming >2 alcoholic drinks/d. As with food reporting, there may be underreporting of alcohol intake. Although this is likely to strengthen the case that moderate alcohol intake is beneficial for bone health, we should be careful about extrapolating data to recommend how much we should consume, especially when the data are collected from FFQs. A unit of alcohol is defined as 8 g or 10 ml ethyl alcohol, which is equivalent to the quantity in a 125-ml glass of wine with an alcoholic strength of 8% alcohol by volume (ABV). In the Tucker et al study, a serving of wine was 118 ml. There are concerns that wineglasses in use today can comfortably contain 250 ml or more, and the strength of wine has increased. It is not unusual to see white wines...
that contain $\geq 12\%$ alcohol, and red wines can contain up to 15% alcohol. A 250-ml glass of white wine could provide $\geq 3$ times as much alcohol (30 g) as previously assumed. The nonassociation between alcohol intake and bone health in premenopausal women may be due to limited power, but there is a danger in assuming that alcohol may be beneficial for all women.

The positive effect of alcohol peaked at 1–2 drinks/d for men, and liquor consumption appeared to be detrimental for men’s bone health. It is not clear in the Tucker et al study whether liquor drinkers were a separate group or if those that consumed beer or wine also drank additional quantities of liquor, and whether this is different for men and women. The lack of association between liquor and outcomes of bone health in women may be because the liquor consumed provides only alcohol (eg, vodka) or it may be due to the small sample size for those drinking liquor. Writing this from Scotland, one cannot omit a reference to the liquor “uisge beath” (Gaelic for “water of life,” a word that was corrupted to “usky” and then “whisky”). It has been suggested that whisky contains high concentrations of the antioxidant ellagic acid, which could potentially be beneficial for bones. This is not a reason to increase whisky consumption because antioxidants can be obtained from fruit and vegetables, which provide other important nutrients.

The association between alcohol intake and bone health deserves further exploration. In light of possible harm with increased dose of alcohol and in agreement with Tucker et al, we would advise caution before making recommendations.

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REFERENCES