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Response to the editor

Reply on "Coffee consumption and bone health: A risk assessment"

To the editor

As pointed by Kawada [1] the mechanisms of caffeine consumption involved in bone health affect bone remodeling and falls risk.

Evidence of observational studies has shown an association between caffeinated beverages consumption and fragility fracture in women [2]. The effect of different drinks containing caffeine has been implicated as a cause of osteoporosis and fragility fracture [3]. Due to the information of observational studies in favor and against this association, there is controversy [4].

Some studies have suggested that the effect of coffee on bone health may be mediated by different mechanisms:

- Deleterious effect on osteoblasts [5,6].
- Increased urinary calcium excretion [7–9].
- Decrease in the efficiency of intestinal absorption [10].
- Low ca1lcium intake in coffee drinkers [11,12].

The cytotoxicity of caffeine has been linked to apoptosis [5,13]. Caspases [14] and Bcl-2 family [15] play an important role in apoptosis, they regulate mitochondrial membrane potential changes and the release of cytochrome C by modulating the permeability of the outer mitochondrial membrane.

Heavy caffeine intake increases the urinary excretion of calcium, whereas moderate coffee consumption (1–2 cups per day) does not have a significantly impact on calcium imbalance in postmenopausal women [8]. It has been associated to a bone mineral density (BMD) loss between 2% and 4% depending on site, but with low risk for osteoporosis (odds ratio, 1.28; 95% confidence interval, 0.88–1.87). Thus, heavy ≥4 cups per day versus low (<1 cup per day) coffee intake might be associated to slight decrease on BMD, without increasing the rate of fractures in women [4]. In men, according to a large cohort assessed by a self-administered food frequency questionnaire, a high coffee consumption was not associated with an increased rate of fractures [16].

At the same time, recent evidence suggests that coffee consumption can help reduce the risk of several diseases: type 2 diabetes, Parkinson disease, Alzheimer disease, cardiovascular disease, and cancer [9]. In the same way, it has been suggested that it might have a protective effect for disability in women with hypertension, obesity or diabetes, and on the risk of falls in elderlies [17,18].

Recent information from a study that managed memory bias observed in self-reported questionnaire for coffee consumption and individual metabolism assessing coffee consumption through metabolomics.

Conversely, a recent study that assessed coffee consumption through an individual assessment of metabolomics, reported a positive association of coffee metabolites, AFMU (5-acetylamino-6-formylamino-3-methyluracil), trignolline, and 3-hydroxyhippurate, with BMD. Likewise, they reported that coffee consumption was directly associated with low rate of hip fractures [19].

Coffee may exert beneficial effects on bone health due to its high polyphenols composition; this impact may be especially prominent in men, who are resistant to caffeine-induced bone loss [20,21]. Recent evidence supports this assumption on younger [22] and older [16] males.

Most information in this matter derives from large epidemiological studies, which assessed coffee intake through self-applied questionnaires, introduction of metabolomics to this problem may bring some light to this matter. But still remains the need to establish the mechanisms of these effects. In the meantime, information about the effect of coffee intake on bone health should be taken with precautions, metabolites involved in this practice may have different effects on osteoporosis risk, bone resistance and risk of fracture.

Declaration of competing interest

No potential conflict of interest relevant to this article was reported.

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