

## Letter: Veganism, vegetarianism, bone mineral density, and fracture risk: a systematic review and meta-analysis

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We have serious concerns about the meta-analysis of fracture risk in vegetarians and vegans in the recent review by Iguacel et al.<sup>1</sup> In their meta-analysis, the authors have used crude risk ratios, calculated simply from the numbers of cases and individuals (cases plus noncases) in each diet group in each study, rather than the incidence rate ratios published, for example, in our 2007 study<sup>2</sup> (reference 19 of Iguacel et al<sup>1</sup>). The risks presented in our study correctly take into account follow-up time and adjust for nondietary factors such as age, smoking, alcohol consumption, body mass index, and physical activity; crude risk ratios do not and are therefore uninterpretable. Accordingly, the crude risk ratios for the comparisons of vegetarian women, vegetarian men, vegan women, and vegan men with omnivores of the same sex used in the meta-analysis of Iguacel et al.<sup>1</sup> (Figure 5: 0.816, 1.323, 1.083, and 1.602, respectively) are very different from the fully adjusted incidence rate ratios in our study (Table 3: 0.98, 1.00, 1.21, and 1.19, respectively; risks adjusted for age and nondietary factors).<sup>2</sup> The authors also conducted a sensitivity analysis in which the results from our paper were excluded as a “possible outlier,” simply as a means to remove the heterogeneous risk ratios used for our study from their meta-analysis. With or without the inclusion of our study, their meta-analysis uses incorrect estimates (based simply on the numbers of cases and individuals by diet group in each study) to produce

uninterpretable overall risks and invalid conclusions with regard to fracture risk.

Moreover, the usefulness of the authors’ meta-analysis of fracture risk is questionable, given that the 5 included studies variously examined risks for all fractures,<sup>2</sup> fractures of the wrist,<sup>3</sup> vertebral fractures,<sup>4</sup> stress fractures,<sup>5</sup> and hip fractures.<sup>6</sup> Therefore, even if the meta-analysis was to be correctly based on published risks from the included studies, it would be difficult to interpret the overall fracture risk.

In conclusion, the meta-analysis of fracture risk by Iguacel et al<sup>1</sup> has serious methodological drawbacks that produce an invalid interpretation of the data.

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