

Recent Study Finds that Calcium from Milk, Calcium-Enriched Orange Juice and Calcium Carbonate Supplements, Provides Equal Benefit to Bone Density in Elderly Subjects

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An important study published in the American Journal of Clinical Nutrition (December, 2002) revealed that elderly subjects given 500 mg of elemental calcium from milk, calcium-enriched orange juice or calcium carbonate supplements showed similar positive effects on bone mineral density parameters, regardless of which of the three sources of calcium they consumed. Each of the twelve subjects studied consumed a low-calcium diet (300 mg/day) and high-calcium (1300 mg/day) diets for three 1-week periods each during a 6-week crossover study. The subjects consisted of 9 women and 3 men, with a mean age of 70 years old. The acute biochemical response to calcium from each of the three sources was assessed during a 4-hour period after the initial breakfast meal of the high-calcium diet. The postprandial suppression of serum parathyroid hormone did not differ significantly between the test meals containing milk, calcium-enriched orange juice or the calcium carbonate supplement. This finding suggests that the calcium bioavailability from the three sources was equivalent. With each of the three high-calcium sources tested, during 1-week high-calcium diet periods, fasting serum calcium increased by 3%, serum 1,25-dihydroxyvitamin D decreased by 20% and a biomarker of bone resorption (serum

N-telopeptide collagen cross links) decreased by 14%, compared with the low-calcium diet period. The researchers conclude that in elderly subjects, the calcium bioavailability of the 3 high-calcium dietary sources tested was equivalent, during both the acute postprandial and longer-term periods.¹

CLINICAL RELEVANCE

A large body of evidence suggests that a high calcium intake throughout life is necessary to attain peak bone mass and to minimize bone loss during aging. Based upon available data, the Food and Nutrition Board of the Institute of Medicine increased their recommended intake levels for calcium from 800 mg to 1200 mg/day for persons over 51 years of age, in 1997.¹ The National Institutes of Health also recommends this level of calcium intake for this segment of the population, and further stipulates that women not using hormone replacement therapy are advised to consider a daily calcium intake level of 1500 mg/day. This recommendation also applies to both women and men over the age of 65 (including women using hormone replacement therapy).² The reality is however, that it is difficult for individuals to achieve an intake of calcium above 1,000 mg/day, and the majority of older individuals have not been shown to be compliant with these recommendations.¹ Thus, it is important to establish practical, safe, and effective interventions to improve compliance with recommended calcium intake guidelines. Elderly individuals are most susceptible to bone loss and osteoporosis due to a decline in circulating estrogen and progesterone levels in women, and androgen levels in males over the age of 65. However, other age-related changes also increase susceptibility, including hypochlorydria, intestinal resistance to Vitamin D, and a decrease in circulating levels of the most potent form of Vitamin D, 1,25 dihydroxyvitamin D.¹

As lactose intolerance becomes more prevalent as we age (and is prominent in non-white populations, affecting mostly blacks and Asians, from an early age), the use of milk and milk products may not be the best dietary source of calcium for a large segment of the population. The introduction of calcium-enriched orange juice several years ago appeared to be a novel way in which to help individuals more easily achieve their calcium needs. The research by Martini and Wood has now shown that the bioavailability of calcium from calcium-enriched orange juice is equivalent to that of milk calcium, which is considered to be the gold standard to which other forms of calcium are compared. The acidity of orange juice, in all probability, helps to improve the absorption of calcium from these products (as does the presence of lactose in milk products) and is of particular importance in older subjects, who are often hypochlorhydric. This study also confirmed that calcium carbonate supplements, taken with food, also provide the body with the same net absorption of elemental calcium as does milk and calcium-enriched orange juice.¹ Although a surprising finding to many holistic practitioners who often consider calcium carbonate to be the "Bogey Man" of calcium supplements, previous studies have shown that calcium carbonate is absorbed from the intestinal tract as well as calcium citrate, calcium citrate-malate and other novel forms of supplemental calcium that are held in higher esteem by many practitioners. It is important to realize that calcium carbonate is the most cost-effective calcium for your patients in regards to the use of calcium supplements. It is the least expensive, provides the most elemental calcium per tablet, and is equally as bioavailable as other preferred calcium supplements. Numerous intervention trials have shown that calcium carbonate supplementation can help increase bone density in younger individuals and slow the rate of bone loss in older subjects. Of all the calcium supplements, it has been used in more clinical and experimental studies than any other form of calcium.^{3,4} The one precautionary note is that calcium citrate is known to be more soluble than calcium carbonate and thus, in patients who have had a previous history of kidney stones some experts prefer the use of calcium citrate (as a precaution against the precipitation of calcium

with oxalate or urate in the kidneys, forming a stone). However, to date there is no evidence linking calcium carbonate ingestion with an increased risk or recurrence of kidney stones.²

CONCLUSION

Osteoporosis affects one in four postmenopausal women in our society and the complications of osteoporotic fractures account for more deaths each year than the combined mortality rate for breast and ovarian cancers.⁵ As such, it is incumbent upon health professionals to provide effective and inexpensive solutions to patients in order to help them (including patients all ages) meet their calcium requirements throughout their lifetime. The study by Martini and Wood has helped to clarify that the bioavailability of calcium from calcium-enriched orange juice and the use of calcium carbonate supplements (taken with a meal) is on par with that of milk. Each of these products has not only been shown to be a rich source of available calcium, but they are also inexpensive sources, making them accessible to large segments of the population who desperately need to increase their intake of this vital mineral as a means to reduce risk of osteoporosis and its life threatening complications.¹

References

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