Beyond the Headlines: The Apparent Failure of Calcium and Vitamin D to Reduce Fractures

By G. Douglas Andersen, DC, DACBSP, CCN

When the news broke that calcium and vitamin D not only failed to reduce significantly the risk of fractures in women over 50, but also increased the risk of kidney stones, many of my patients were understandably concerned and confused.

A common question was, "All we've heard for years was how important it is to take calcium! Now they say it won't help my bones, but it will cause stones."

The Women’s Health Initiative recruited subjects between 1995 and 2000, and then followed them for an average of seven years as part of a double-blind, placebo-controlled study that compared calcium and vitamin D supplementation with placebo. Total participants numbered 36,282 and were randomized to two groups: 18,176 took 500 mg of calcium carbonate and 200 IU vitamin D twice a day (totaling 1,000 mg of calcium carbonate and 400 IU of vitamin D); 18,106 took identical placebo pills. The ages of the women at the start of the study ranged from 50 to 79 years, with a mean age of 62. The mean body mass index per subject was 29. Subjects who were taking calcium and vitamin D prior to the study were allowed to continue, regardless of the group to which they were assigned. The average calcium intake from diet and supplements of all participants was 1,150 mg daily. At the onset of the study, there were 10,725 women who were on personal hormone therapy. Another 8,117 in randomized fashion also received hormones. Thus, 18,942 out of 36,282 were on hormones. By the end of the study, another 6,099 were taking osteoporosis medications, which broke down as follows:

<table>
<thead>
<tr>
<th>Osteoporosis Medicine Use</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alendronate</td>
<td>3,890</td>
</tr>
<tr>
<td>Risedronate</td>
<td>654</td>
</tr>
<tr>
<td>Raloxifene</td>
<td>1,094</td>
</tr>
<tr>
<td>Calcitonin</td>
<td>451</td>
</tr>
</tbody>
</table>

Beyond the Headlines

Headlines, sound bites, summaries and 100-word reports frequently omit critical data instead of providing the whole story. This trial and the headlines that followed are another example. Below is data that did not
As previously mentioned, the average daily calcium intake of both groups at the beginning of the study was 1,150 mg. Women who were taking calcium supplements were allowed to continue.

- 64% of the women at baseline consumed over 800 mg of all-source calcium daily.
- 7.2% of the participants had an all-source calcium intake of less than 400 mg at the onset of the study.
- 52% of the women were on hormone therapy (18,942).

By the end of the trial 6,099 women were taking osteoporosis medication (17%).

- 24% of the women stopped taking the pills before the trial ended.
- 59% of the women were at full compliance at the end of the trial.

The pre-study predicted fracture rate was 34 per 10,000 women per year. The actual fracture rate at the conclusion of the study was 16 per 10,000 women per year.

The 50% reduction in fractures predicted resulted in a 48% reduction in the power of the study, according to the authors.

**Study Results**

<table>
<thead>
<tr>
<th>Group</th>
<th>Calcium and vitamin D</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants*</td>
<td>18,176</td>
<td>18,106</td>
</tr>
<tr>
<td>Total fractures**</td>
<td>2102</td>
<td>2158</td>
</tr>
<tr>
<td>Hip fractures</td>
<td>175</td>
<td>199</td>
</tr>
<tr>
<td>Vertebral fractures</td>
<td>181</td>
<td>197</td>
</tr>
<tr>
<td>Ulna/radius/wrist fractures</td>
<td>565</td>
<td>557</td>
</tr>
<tr>
<td>Withdrawals plus lost to follow-up</td>
<td>496</td>
<td>484</td>
</tr>
<tr>
<td>Deaths</td>
<td>744</td>
<td>807</td>
</tr>
<tr>
<td>Kidney stones</td>
<td>449</td>
<td>381</td>
</tr>
</tbody>
</table>

* Average follow-up time: seven years

** There were no separate data given for fractures of the fingers, toes, tibia, fibula, humerus, femur, pelvis, scapula, or craniofacial region.

- The 12% reduction in hip fractures attained by the calcium and vitamin D group was deemed not statistically significant by the authors.
- The 29% reduction in hip fractures for subjects who had an 80% compliance rate was statistically significant and equated to a rate reduction of four per 10,000 women per year.
- There was a 30% reduction in fractures in members of the calcium and vitamin D group who were...
taking other supplements prior to and during the study.

- There was no statistically significant interaction between calcium and vitamin D at baseline and vitamin D levels with respect to either hip fractures or total fractures.
- When the authors analyzed serum vitamin D, subjects were divided by serum 25 hydroxy vitamin D levels, which included 60 nmol/l, 44-60 nmol/l, 32-43 nmol/l, and <32 nmol/l.
- At the onset of the study, subjects received 400 IU of vitamin D or placebo. This had long been accepted as an adequate amount. A recent meta-analysis, performed long after the study began, revealed that it takes 700 IU of vitamin D daily to reduce fractures.\(^2\) And in another review, the level of serum vitamin D needed to reduce fracture incidence was determined to be 75 nmol/l.\(^3\) (The highest grouping in the Women’s Health Initiative study was 60 nmol/l.) It would be interesting to study those individuals whose vitamin D exceeded 75 nmol/l.
- The fact that there were more kidney stones in the 18,000 women on calcium supplements was understandably frustrating. The authors stated that there did not appear to be any interaction between baseline calcium and kidney stones. Furthermore, they stated in a reply to a letter to the editor\(^4\) that it appeared women with lower baseline calcium levels had a slightly increased risk of stones. This conundrum will require further study and investigation to determine if it is a) simple anomaly; b) subset of susceptible individuals to calcium exists; or c) a chelating agent problem. For example, unlike calcium carbonate, calcium citrate inhibits the aggregation of oxalate crystals.\(^5\)

**A More Accurate Sound Bite**

The following is what we should have heard on our radios and televisions: Women who are not, on average, calcium deficient and do, on average, take medications that favorably affect bone density, will lower their risk of fracture by 50%.

**Conclusion**

Jackson and La Croix, et al., conclude their paper with the following, and I quote: "Although the statistically null primary effect argues against recommending universal calcium with vitamin D supplementation for already calcium-replete women, the findings provide evidence of a positive effect of calcium with vitamin D on bone health in older postmenopausal women."\(^1\)
References


Click [here](https://www.dynamicchiropractic.com/mpacms/dc/article.php?id=51327&no_paginate=true&p_friendly=true?no_b=true) for more information about G. Douglas Andersen, DC, DACBSP, CCN.