



Stronger Bones



Drinking Aava's bicarbonates and calcium content boosts bone mineral density, reduces bone resorption and improves bone metabolism.

1. The Journal of Nutrition: *The Effect of the Alkali Load of Mineral Water on Bone Metabolism: Interventional Studies, 2008*

Alkali supplements decrease bone resorption and increase bone mineral density. Alkali diets also lower bone resorption. Mineral waters alone could have such an effect. In several subsequent studies in humans, bicarbonate-rich alkali mineral waters with low potential renal acid load values were shown to decrease bone resorption markers and even parathyroid hormone levels. This effect seems to be stronger than that of acidic calcium-rich mineral waters and could also be demonstrated in calcium sufficiency.

<https://academic.oup.com/jn/article/138/2/435S/4665085>

2. World Health Organisation: *Calcium Magnesium in Drinking Water and Public Health Significance, 2009*

The bioavailability of calcium from water is likely subject to the same influences as for calcium bioavailability from food. Therefore, divided doses throughout the day promote calcium absorption efficiency, which would suggest that the habit of sipping on water throughout the day is preferential to bolus consumption of food sources of calcium. **There is indication that calcium from high-calcium water (and calcium from other sources) is beneficial to bone health by suppressing bone resorption.**

https://www.who.int/water_sanitation_health/publications/publication_9789241563550/en/

3. The American Journal of Clinical Nutrition: *Mineral Water as a Source of Dietary Calcium: Acute Effects on Parathyroid Function and Bone Resorption in Young Men*

Background: Calcium is a major component of mineralized tissues and is required for normal growth and maintenance of bone. Epidemiologic studies showed that a large percentage of the population fails to meet the currently recommended guidelines for optimal calcium intake.

Objective: The present study was designed to determine whether high-calcium mineral water is an efficient additional source of dietary calcium.

Conclusion: Ingestion of high-calcium water induced a significant increase in both ionized calcium (repeated-measures two-factor analysis of variance: time, $P < 0.003$; treatment, $P < 0.005$; time-by-treatment interaction, $P < 0.02$) and urinary calcium (time, $P < 0.06$; treatment, $P < 0.001$; time-by-treatment interaction, $P < 0.004$).

Drinking calcium-rich mineral water several times a day could be recommended because it would provide both supplemental calcium and adequate hydration.

In conclusion, the results of the present study showed that high-calcium **mineral water not only represented an additional dietary source of calcium but also modulated parathyroid function and bone metabolism.**

<https://academic.oup.com/ajcn/article/71/4/999/4729209>



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4. The Journal of Nutrition, Health and Ageing: *Biological Effects of Drinking-Water Mineral Composition on Calcium Balance and Bone Remodeling Markers*, 2004

Objective: To compare the effects of 2 drinking waters containing similar calcium (Ca) concentration in order to analyze the role of ions other than Ca on bone metabolism. These mineral drinking-waters differed by their mineral composition primarily concerning the concentration of bicarbonate (HCO_3^-), high in the HB, and sulfate, high in HS water.

Conclusions: These results showed a beneficial effect of the bicarbonate rich HB water on bone metabolism. This may account for a better bioavailability of the Ca, a greater alkalinization, and a larger decrease in PTH level secondary to a higher ionized Ca level. The higher content of silica in HB water may have also participated to the positive action on bone balance that was observed. In this short term study, these data underlined the potential role of the mineral drinking water composition on bone metabolism.

<https://pubmed.ncbi.nlm.nih.gov/15359356/>

5. Bone Volume 4 Issue 1 Randomised Clinical Trial: *Alkaline Mineral Water Lowers Bone Resorption even in Calcium Sufficiency: Alkaline Mineral Water and Bone Metabolism*, 2008

Background: Dietary acid charge enhances bone loss. Bicarbonate or alkali diet decreases bone resorption in humans. We compared the effect of an alkaline mineral water, rich in bicarbonate, with that of an acid one, rich in calcium only, on bone markers, in young women with a normal calcium intake.

Conclusion: In calcium sufficiency, the acid calcium-rich water had no effect on bone resorption, while the alkaline water rich in bicarbonate led to a significant decrease of PTH and of S-CTX

<https://pubmed.ncbi.nlm.nih.gov/18926940/>

6. Revue Médicale Suisse: *Mineral Waters and Bone Health*, Peter Burckhardt, 2004

Some mineral waters contain minerals in such high concentrations that they can influence bone health when consumed regularly. **Calcium from mineral water is readily absorbed, inhibits PTH secretion and bone resorption on the short as well as on the long term.** Sodium concentrations are too low to bother, sulfates have no documented bone effect, but fluoride can in rare cases be so high that it increases bone density. **Since potassium and bicarbonate lower renal calcium excretion, and since the latter improves calcium balance, mineral waters rich in bicarbonate and potassium have been tested. Indeed, they lowered renal calcium excretion and bone resorption in short and medium term trials, and they could be of particular interest in the prevention of osteoporosis in addition to calcium-rich waters.**

<https://pubmed.ncbi.nlm.nih.gov/15095624/>



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7. Journal of Bone and Mineral Research: *Association Between Calcium Ingested from Drinking Water and Femoral Bone Density in Elderly Women: Evidence from the EPIDOS Cohort, 1999*

Although the main source of dietary calcium is dairy products, **the calcium contained in mineral water, which is as available as that of milk, could provide a valuable source of calcium.** We analyzed the data from the EPIDOS multicenter study to evaluate the relationship between both dietary calcium and that supplied by drinking water and bone density measured at the femoral neck by dual-energy X-ray absorptiometry. The study included 4434 women over 75 years of age who had not received any treatment likely to interfere with calcium metabolism. **A significant correlation was found between total calcium intake and bone density at the femoral neck.**

After adjustment for the main variables influencing bone density, an increase of 100 mg/day in calcium from drinking water was associated to a 0.5% increase in femoral bone density, while a similar increase in dietary calcium from other sources only led to a 0.2% increase.

The consumption of calcium-rich mineral water may be of interest, especially in older women who consume little calcium from dairy products.

<https://asbmr.onlinelibrary.wiley.com/doi/full/10.1359/jbmr.1999.14.5.829>

8. MDPI Nutrient: *Calcium Intake in Bone Health: A Focus on Calcium-Rich Mineral Waters, 2018*

Calcium is an essential element that plays numerous biological functions in the human body, of which one of the most important is skeleton mineralization. Bone is a mineralized connective tissue in which calcium represents the major component, conferring bone strength and structure. Proper dietary calcium intake is important for bone development and metabolism, and its requirement can vary throughout life. **The mineral composition of drinking water is becoming relevant in the modulation of calcium homeostasis.** In fact, calcium present in mineral drinking waters is an important quantitative source of calcium intake.

Our study shows that calcium-rich water can be a good source of dietary calcium in young women, providing a significant intake of bioavailable calcium, which we have indirectly evaluated through the measurement of 24-h urinary calcium. Therefore, our study confirms that calcium-rich mineral water is a valuable calorie-free nutritional source of highly bioavailable calcium, and that it can significantly contribute to achieving the daily requirements of this element. In our study the lack of the effects of calcium from calcium-rich water on bone biomarkers does not exclude the possibility that in a longer observation and in populations more prone to an increased bone remodeling status (i.e., post-menopausal women) this effect could be found.

<https://www.mdpi.com/2072-6643/10/12/1930>



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9. BMC Research Notes: *A Double-blind, Placebo-controlled Study of the Short Term Effects of a Spring Water Supplemented with Magnesium Bicarbonate on Acid/base Balance, Bone Metabolism and Cardiovascular Risk Factors in Postmenopausal Women*

Background: A number of health benefits including improvements in acid/base balance, bone metabolism, and cardiovascular risk factors have been attributed to the intake of magnesium rich alkaline mineral water. This study was designed to investigate the effects of the regular consumption of magnesium bicarbonate supplemented spring water on pH, biochemical parameters of bone metabolism, lipid profile and blood pressure in postmenopausal women.

Conclusions: Short term regular ingestion of magnesium bicarbonate supplemented water provides a source of orally available magnesium.

Trial registration: ACTRN12609000863235.

<https://bmcresearchnotes.biomedcentral.com/articles/10.1186/1756-0500-3-180>

10. Proceedings of the Nutrition Society (PNS) 2010: *Postgraduate Symposium: Positive Influence of Nutritional Alkalinity on Bone Health*

There is growing evidence that consumption of a **Western diet is a risk factor for osteoporosis through excess acid supply, while fruits and vegetables balance the excess acidity, mostly by providing K-rich bicarbonate-rich foods.** Western diets consumed by adults generate approximately 50-100 mEq acid/d; therefore, healthy adults consuming such a diet are at risk of chronic low-grade metabolic acidosis, which worsens with age as a result of declining kidney function. **Bone buffers the excess acid by delivering cations and it is considered that with time an overstimulation of this process will lead to the dissolution of the bone mineral content and hence to reduced bone mass.**

In a further study to complement these findings it has also been shown in a group of thirty young women that in Ca sufficiency an acid Ca-rich water has no effect on bone resorption, **while an alkaline bicarbonate-rich water leads to a decrease in both serum parathyroid hormone and serum C-telopeptide.**

Mineral-water consumption could be an easy and inexpensive way of helping to prevent osteoporosis and could be of major interest for long-term prevention of bone loss.

<https://www.cambridge.org/core/journals/proceedings-of-the-nutrition-society/article/postgraduate-symposium-positive-influence-of-nutritional-alkalinity-on-bone-health/02F72FA750B15600644A1D8A00934C34>