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# Calcium supplementation for improving bone mineral density in children: Evidence and implications for public health

**Review on which this evidence summary is based**:
Winzenberg, T.M., Shaw, K., Fryer, J., & Jones, G. (2006). **Calcium supplementation for improving bone mineral density in children.** *Cochrane Database of Systematic Reviews*, Issue 2, Art. No.: CD005119.

## Review Focus

**P** Healthy children (age<18 years)

**I** Calcium supplementation including supplementation by food sources, calcium citrate malate, calcium carbonate, calcium phosphate, calcium lactate gluconate, calcium phosphate milk extract or milk minerals with calcium dose ranging from 300 to 1200 mg per day

**C** Placebo

**O** Bone mineral density or bone mineral content in the hip, spine, arm or body overall

**Review Quality Rating:** 9 (strong) *Details on the methodological quality are available here*

## Considerations for Public Health Practice

| Conclusions from Health Evidence | General Implications |
|---|---|
| This high quality review is based on primary studies of moderate methodological quality.<br><br>Calcium supplementation had:<br>• a small, positive effect on bone mineral density for upper limb (short term but not long term)<br>• no impact on bone mineral content for total body, femoral neck, or lumbar spine<br><br>Baseline calcium intake, sex, physical activity, duration of supplementation and type (e.g. milk extract) did not impact findings.<br><br>The association between the increase in upper limb bone mineral density and fracture risk was not directly assessed in the studies.<br><br>*NOTE: The results were taken from the sensitivity analyses, which represent a more conservative estimate of effect.* | Current evidence suggests there are no significant positive gains to be realized from public health activities to promote calcium supplementation among healthy children.<br><br>Public health decision makers should note that fracture rates were not assessed. However, it is unlikely that the small increase in bone mineral density of the upper limb will lead to a clinically significant decrease in fracture risk later in life.<br><br>Evidence remains insufficient to make conclusions specific to peripubertal or non-Caucasian populations, or those with a baseline calcium intake <500 mg/day. |

## Evidence and Implications

| What's the evidence? | Implications for practice and policy |
|---|---|
| **1. Calcium supplementation (19 RCTs, 2859 children)**<br>• Calcium supplementation led to an increase in upper limb bone mineral density compared to placebo (**SMD +0.14** mg/cm$^2$, 95%CI +0.04, +0.24) (13 studies); an effect | **1. Calcium supplementation**<br>• Calcium supplementation among healthy children by public health is not supported at this time.<br>• There is insufficient evidence to support calcium |

| | |
|---|---|
| equal to a ~1.7% greater increase in supplemented groups, which at best would reduce absolute fracture risk in children by 0.1-0.2% per annum based on average peak fracture incidence. However, results were not maintained after supplementation was stopped.<br>• No impact observed on femoral neck or lumbar spine bone mineral density, or on total body bone mineral content. | supplementation of any dose/duration among healthy children to increase long-term lumbar bone mineral content, femoral neck bone mineral density, total body bone mineral content, or upper limb bone mineral density. |
| **Legend:** P – Population; I – Intervention; C – Comparison group; O – Outcomes; CI – Confidence Interval; OR – Odds Ratio; RR – Relative Risk; SMD – Standardized Mean Difference; ***For definitions see the healthevidence.org glossary* http://www.healthevidence.org/glossary.aspx | |

## Why this issue is of interest to public health in Canada

Osteoporosis is a major and growing public health problem, particularly in women.[1] In 2009, 1.5 million Canadians 40 years of age or older reported having been diagnosed with osteoporosis,[2,3] and women were 4 times more likely to report having osteoporosis than men. Fractures associated with osteoporosis lead to mortality, disability, and significant health care system use.[2] The treatment of osteoporosis and related fractures is estimated to cost the Canadian health care system $1.9 billion annually.[3] Low bone mineral density is a major risk factor for osteoporotic fracture.[1,2] It is recognized that building strong bones during childhood and adolescence can be the best defence against developing osteoporosis later, particularly as peak bone mass is achieved at an early age, age 16 in girls and age 20 in young men.[3] The Public Health Agency of Canada recommends the use of age-appropriate calcium and vitamin D as two means of reducing osteoporosis risk.[2] As such, assessing the effectiveness of supplementation in paediatric populations is worthwhile.


1. Winzenberg, T.M., Shaw, K., Fryer, J., & Jones, G. (2006). Calcium supplementation for improving bone mineral density in children. Cochrane Database of Systematic Reviews, Issue 2, Art. No.:CD005119.
2. Public Health Agency of Canada. (2010). *What is the impact of osteoporosis in Canada and what are Canadians doing to maintain healthy bones? 2009.* Retrieved from http://www.phac-aspc.gc.ca/cd-mc/osteoporosis-osteoporose/pdf/osteoporosis.pdf
3. Osteoporosis Canada. (2011). *Facts and statistics.* Retrieved from http://www.osteoporosis.ca/index.php/ci_id/8867/la_id/1.htm


***Other quality reviews on this topic are available on http://www.healthevidence.org***

## Suggested citation


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