International Centre for Allied Health Evidence

University of South Australia

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iCAHE

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*i*CAHE JC Critical Appraisal Summary

Journal Club Details

Journal Club location FMC

JC Facilitator Cassandra Lawless

JC Discipline Nutrition & Dietetics

CAT completed by: Holly

Background

In practice us Dietitians will consult with clients who have had a fall which resulted in a fracture which otherwise should have not resulted in a fracture indicating frailty, or poor bone health. We educate clients on increasing dietary calcium (mostly via dairy foods) and if they cannot increase their dietary calcium intake then we would recommend calcium supplementation (e.g. caltrate tablet/s). Recently, there has been some evidence that has arisen showing that calcium supplementation does not actually improve bone health or reduce the risk of fractures.

Clinical Scenarioe

N/A

Review Question/PICO/PACO

P – clients aged >60 years of age with a minimal trauma fracture
I – calcium supplementation (via tablet)
C - no calcium supplementation
O – bone mineral density (BMD), fracture risk, fracture incidence

Article/Paper

Bolland, MJ, Leung, W, Tai, V, Bastin, S, Gamble, GD, Grey, A, Reid, IR 2015, 'Calcium intake and risk of fracture: systematic review', BMJ, vol. 351, h4580

Please note: due to copyright regulations CAHE is unable to supply a copy of the critically appraised paper/article. If you are an employee of the South Australian government you can obtain a copy of articles from the DOHSA librarian.

Article Methodology: Systematic Review

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Ques No.	Yes	Can't Tell	No	Comments
1	✓			**Did the review address a clearly focused question?** To examine the evidence underpinning recommendations to increase calcium intake through dietary sources or calcium supplements to prevent fractures.
2	✓			**Did the authors look for the appropriate sort of papers?** The authors searched Ovid Medline and Embase since inception to July 2013 for English language studies of calcium, milk, or dairy intake, or calcium supplements that reported on a broad range of skeletal and non-skeletal endpoints including fracture. The full text of the search was designed with assistance from a professional librarian. From this search, the authors also identified 120 systematic reviews or meta-analyses on these topics and hand searched these articles, any other articles included in this review, and recent review articles on fracture risk for other relevant articles. In September 2014, the authors updated the results with a focused search (no language restrictions) of PubMed and Embase for studies with fracture or bone mineral density as an endpoint. **Is it worth continuing?** **YES**
3	✓			**Do you think the important, relevant studies were included?** The authors included randomised controlled trials and cohort, case-control, or cross sectional studies with fracture as an outcome in which participants were aged >50 at baseline, or for cohort studies, where most follow-up occurred in participants aged >50. They excluded studies where most participants had a major systemic pathology at baseline other than osteoporosis, such as renal failure or malignancy. They included studies of calcium supplements used in combination with other treatment provided that the other treatment was given to both arms (for example, calcium plus oestrogen v placebo plus oestrogen), and included studies of co-administered calcium and vitamin D supplements (CaD). The authors classified milk, dairy products, and dietary calcium intake from food as dietary sources of calcium. They treated hydroxyapatite as a dietary source of calcium, though it is not a food because hydroxyapatite supplements are made from bone and contain other minerals, hormones, protein, and amino acids in addition to calcium. Several cohort studies reported analyses of calcium intake and fracture risk in more than one publication. They included the results from the publication that reported the longest duration of follow-up for the cohort. Titles and abstracts were screened by one author (WL or MJB) and the full text of potentially relevant studies reviewed by two authors independently (WL, MJB, VT, or SB).
4	✓			**Did the review's authors do enough to assess the quality of the included studies?** Risk of bias was assessed as recommended in the Cochrane Handbook, and we planned a subgroup analysis for each fracture outcome stratified by risk of bias. Critical appraisal beyond assessment of risk of bias was not conducted. Risk of bias does fulfil the requirements of assessing for quality, however a structured critical appraisal, such as the CASP or SIGN, is preferred.

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5	✓			**If the results of the review have been combined, was it reasonable to do so?** For randomised controlled trials, data were pooled with random effects meta-analyses and heterogeneity was assessed with the I2 statistic (I2 >50% was considered significant heterogeneity). The authors used funnel plots and Egger's regression model to assess for bias. For prospective cohort studies, authors reported their data in four different ways: the risk of fracture by group with the cohort divided into two to five groups by baseline dietary intake; pooled risk of fracture per unit of dietary intake; mean baseline dietary intake in individuals with or without subsequent fracture; or a written description of any association.
6				**What are the overall results of the reviews?** There were only two eligible randomised controlled trials of dietary sources of calcium (n=262), but 50 reports from 44 cohort studies of relations between dietary calcium (n=37), milk (n=14), or dairy intake (n=8) and fracture outcomes. For dietary calcium, most studies reported no association between calcium intake and fracture (14/22 for total, 17/21 for hip, 7/8 for vertebral, and 5/7 for forearm fracture). For milk (25/28) and dairy intake (11/13), most studies also reported no associations. In 26 randomised controlled trials, calcium supplements reduced the risk of total fracture (20 studies, n=58 573; relative risk 0.89, 95% confidence interval 0.81 to 0.96) and vertebral fracture (12 studies, n=48 967. 0.86, 0.74 to 1.00) but not hip (13 studies, n=56 648; 0.95, 0.76 to 1.18) or forearm fracture (eight studies, n=51 775; 0.96, 0.85 to 1.09). Funnel plot inspection and Egger's regression suggested bias toward calcium supplements in the published data. In randomised controlled trials at lowest risk of bias (four studies, n=44 505), there was no effect on risk of fracture at any site. Results were similar for trials of calcium monotherapy and co-administered calcium and vitamin D. Only one trial in frail elderly women in residential care with low dietary calcium intake and vitamin D concentrations showed significant reductions in risk of fracture. Dietary calcium intake is not associated with risk of fracture, and there is no clinical trial evidence that increasing calcium intake from dietary sources prevents fractures. Evidence that calcium supplements prevent fractures is weak and inconsistent.
7				**How precise are the results?** 95% Confidence Intervals and P values are reported.

8	Journal Club to discuss	**Can the results be applied to the local population? Choose relevant context issues. The following are only suggestions to prompt discussion.** **CONTEXT ASSESSMENT** – *Infrastructure* – *Available workforce (? Need for substitute workforce?)* – *Patient characteristics* – *Training and upskilling, accreditation, recognition* – *Ready access to information sources* – *Legislative, financial & systems support* – *Health service system, referral processes and decision-makers* – *Communication* – *Best ways of presenting information to different end-users* – *Availability of relevant equipment* – *Cultural acceptability of recommendations* *Others*
9		**Were all important outcomes considered?**
10		**Are the benefits worth the harms and costs?**
11		**What do the study findings mean to practice (i.e. clinical practice, systems or processes)?**
12		**What are your next steps?** ***ADOPT, CONTEXTUALISE, ADAPT*** **And then (e.g. evaluate clinical practice against evidence-based recommendations; organise the next four journal club meetings around this topic to build the evidence base; organize training for staff, etc.)**
13		**What is required to implement these next steps?**

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