



Improving Dietary Calcium Availability for Better Health

Executive Summary

A healthy diet must meet micronutrient requirements to promote wellbeing and prevent disease. Micronutrients are essential for growth and development for example, calcium for maintaining strength in teeth and bones.

Globally 3.5 billion people are at risk of calcium deficiency, due to inadequate dietary supply, associated with the risk of preeclampsia, rickets and osteoporosis.

In the UK, 15% of children (11-18yrs) and 18% of women (19-74yrs) did not meet the minimum required calcium intake, according to the National Diet and Nutrition Survey 2016/17 – 2018/19.

With a rise in plant-based diets, research into non-dairy sources of calcium must acknowledge the concept of calcium content vs bioavailability. Doing so is vital in providing complete dietary advice.

Calcium content refers to gross amount, while calcium bioavailability refers to the percentage of calcium our bodies can absorb and use.

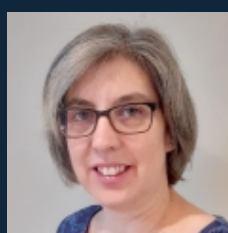
Bioavailability provides pivotal knowledge regarding the effectiveness of calcium fortification, and the impacts anti-nutritional factors, such as oxalates and phytates present in plant-based foods, have on calcium absorption.

Further investigations into factors influencing micronutrient availability will deliver education, dietary advice and ultimately contribute to improved public health.

Policy Recommendations

- Transparent marketing of non-dairy sources of calcium rich foods on product packaging: “Source of calcium” claims on front of pack labelling, must contain at least 15% of the Nutrient Reference Value (NRV) per portion (105 mg), ideally reflecting bioavailable calcium. Back of pack labelling must display nutritional information per 100g, based on an adult NRV of 700 mg of calcium per day.
- Increase crop diversification and utilisation of bioavailable plant-based calcium sources: Despite 7,000 to 30,000 available edible plant species, global diets rely on just a handful of crops. To improve nutrient intake and diversify food systems, yields of calcium rich plants e.g. kale in the UK and finger millet in Africa and Asia must be expanded.
- Implement nutritional composition standards for plant-based products: Nutritional compositions of plant-based dairy alternatives including the chemical form of calcium used in fortification, e.g. using calcium carbonate and organic forms of calcium should be introduced and regulated.
- Comprehensive education on cooking methods and how food compositions change with cooking: School curricula should include the impact of different cooking methods, e.g. steaming, boiling and frying on anti-nutritional factors.

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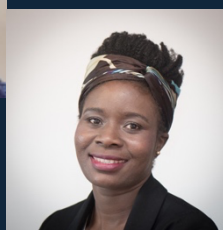
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Bioavailable Calcium Findings in Plant-based Products

The research focuses on the comparison of bioavailable calcium in 25 plant-based sources relative to bovine milk.

Using bovine skimmed milk as a baseline: a 240 ml glass of milk contains 300 mg calcium, of which 30% is bioavailable. For adults, 90 mg bioavailable calcium provides 13% of 700 mg daily reference value (DRV). Dietary advice currently states a glass of milk provides 42% DRV due to a 300 mg calcium content.

Focusing on gross content is misrepresentative of the percentage of calcium our bodies absorb and utilise. The stark difference highlights the need for dietary guidelines prioritising bioavailability.

Only 3 out of the 25 foods tested were equivalent or a better source of calcium than milk - Kale, Finger Millet Porridge and Fortified White Bread (Figure 1).

Kale provides 50% of daily calcium requirement in an 80 g serving, supplying 5 times more calcium than milk.

Despite high calcium content, plant-based beverages have less than 5% bioavailable calcium compared to 30% for bovine milk.

Project Benefit

Implementing the recommendations made here would contribute to improvements in public health through improved dietary advice and education. Additionally, implementation will support progress across multiple SDGs.

SDG 2 – Zero Hunger: Global crop utilisation improving nutrient accessibility is vital in delivering zero hunger.

SDG 3 – Good Health: Through improved understanding of the complexities of interacting micronutrients better nutritional advice can be given and followed.

SDG 4 – Quality Education: Improved knowledge of non-dairy sources of calcium and impact of cooking methods on food composition is essential for delivering quality education.

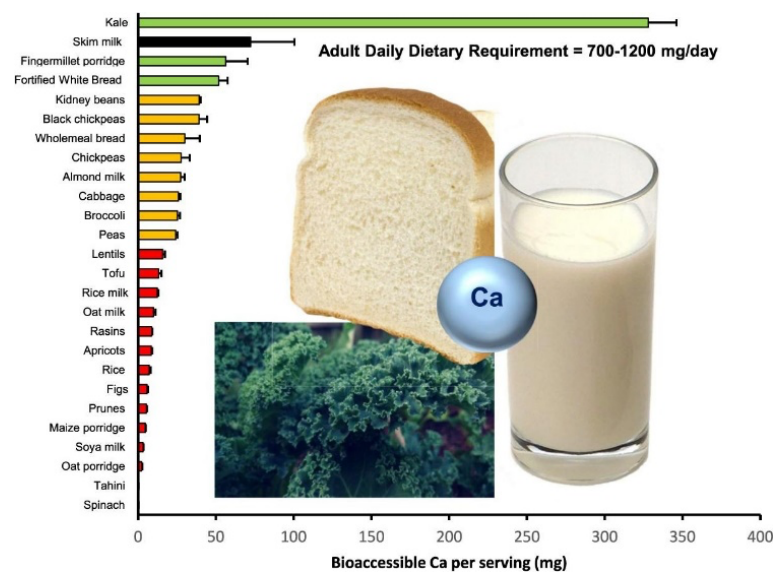


Figure 1 Ranking of the bioaccessible calcium supplies per serving of 25 plant-based products

Research highlights the variability in the nutritional composition of foods, demonstrating the need for bioavailability of micronutrients research in order to provide complete dietary advice

Further Reading

Muleya, M., Bailey, E.F. and Bailey, E.H. (2024)

<https://doi.org/10.1016/j.foodres.2023.113795>

UK Government (2020)

<https://www.gov.uk/government/statistics/ndns-results-from-years-9-to-11-2016-to-2017-and-2018-to-2019/ndns-results-from-years-9-to-11-combined-statistical-summary#micronutrients-and-blood-or-urine-analytes>

Shlisky et al (2022)

<https://doi.org/10.1111/nyas.14758>