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Are all "milks" created equal?

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In a linked article, Lee and colleagues[1] describe a significant negative association between the consumption of non–cow's milk beverages and serum 25-hydroxyvitamin D levels in a large, cross-sectional sample of healthy Canadian children one to six years old. More than 10% of the children in the study drank such beverages, which attests to consumer interest in the growing range of milk alternatives. Commercially available cow's milk requires mandatory vitamin D fortification.[2] Perhaps unbeknownst to parents and caregivers, fortification of non–cow's milk beverages is voluntary,[3] and not all of the products are fortified, which may have contributed to the lower 25-hydroxyvitamin D levels reported by Lee and colleagues. Fortunately, voluntary fortification of milk alternatives is still overseen by Canadian regulatory bodies. Nevertheless, the bioavailability of the calcium salt and form of vitamin D (D_2 v. D_3) in non–cow's milk beverages may differ from that in cow's milk.[4,5] The study findings compel us all to read labels carefully and counsel parents and caregivers specifically about how best to meet nutritional targets.

To our knowledge, this is the first Canadian study to examine the effect on 25-hydroxyvitamin D — the circulating form of vitamin D — from drinking non–cow's milk beverages. Data in this area are lacking, but essential given Canada's unique fortification policies and northern latitude (> 42ºN). Natural dietary sources of vitamin D are limited (Box 1). Although vitamin D is synthesized through exposure to solar radiation, endogenous production of vitamin D is seasonal and not reliable. Therefore, Canadians depend on fortified food sources and possibly vitamin D supplementation to help meet their needs. Canada's Food and Drug Regulations[2] mandate the fortification of cows' milk (300–400 IU in a reasonable daily intake of about 1 L) and margarine (530 IU per 100 g); these foods are closely monitored to establish targeted vitamin D concentrations.

Although cow's milk and non–cow's milk beverages are not necessarily created equal, it is fortunate that few of the young children assessed by Lee and colleagues were deficient in vitamin D regardless of the beverages consumed. This may reflect concurrent use of vitamin D supplements, or a generous estimated average requirement for vitamin D (the amount that meets the needs of 50% of the population). For children and youth 1 to 18 years old, the estimated average requirement was set at 400 IU/d based on the ability to achieve a serum 25-hydroxyvitamin D level above 40 nmol/L, which is thought to be sufficient for bone health.[6] A level of 50 nmol/L was set for the recommended dietary allowance (covering the needs of 97.5% of the population), with the recommended intake set to 600 IU/d to meet this higher cutoff.[6]

Vitamin D intake among young children may be much lower than the estimated average requirement. A study using data from the 2004 Canadian Community Health Survey Cycle 2.2 showed a mean dietary intake of 248 IU/d of vitamin D among children one to eight years old.[7] In a large, ethnically diverse, year-round, cross-sectional assessment of 508 preschool-aged children from Montréal (latitude 45ºN), almost 95% had a vitamin D intake less than the estimated average requirement (median total intake 236–396 IU/d depending on the assessment method).[8] However, vitamin D status in this group was adequate (mean 74 nmol/L, 95% confidence interval 60–94 nmol/L), with only 4% having a level below 40 nmol/L.[8] Similarly, a well-designed randomized trial conducted in New Zealand (latitude 46ºS) found that consumption of 160 IU/d of vitamin D, equivalent to the amount found in 500 mL of fortified cow's milk, was sufficient to maintain

Key points

- Young Canadian children appear to have good vitamin D status, although targeted vitamin D supplementation may be necessary for children who drink non–cow's milk beverages not regularly fortified with vitamin D.
- Non–cow's milk beverages, including goat's milk and plant-based milk alternatives, are fortified with vitamin D at the discretion of the manufacturer, which could lead consumers to overestimate the nutritional content of such beverages.
- Health care practitioners play an important role in educating families on appropriate vitamin D sources to ensure nutritional adequacy.

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Box 1: Vitamin D concentrations in selected foods*

Food source	Vitamin D, IU/serving
Natural source of vitamin D	
Cod liver oil, 15 mL	1279
Salmon, baked or broiled, 100 g	254–932†
Egg yolk, cooked, 1	32
Fortified source of vitamin D	
Fortified cow's milk, 250 mL	100
Margarine, 5 mL	25
Fortified plant-based beverage (soy, rice) or orange juice, 250 mL	87–100

*Vitamin D concentrations were obtained from the Canadian Nutrient File database (webprod3.hc-sc.gc.ca/cnf-fce/index-eng.jsp).
†Values for salmon vary depending on the type (e.g., Atlantic, coho, sockeye) and the source (farmed or wild).

a 25-hydroxyvitamin D level of 50 nmol/L or higher year-round in children 12 to 20 months old.[9]

These data suggest that young children do not need to consume as much as 400 IU/d to meet targets and that fortified milk is an important source for vitamin D, contributing 66%–72% of total intake.[8] Because older children and adults likely require at least 400–600 IU/d to meet currently recommended requirements, we must be even more vigilant about their food choices to ensure an adequate intake. For them, supplementation may be critical.

Unfortunately, no specific data were obtained on the kind of non–cow's milk beverages consumed in the study by Lee and colleagues. We recognize that manufacturers may be changing their fortification practices in response to growing public interest in vitamin D. Health care providers will need to pay close attention to these changing practices when counselling on dietary sources of vitamin D and calcium, particularly as children's milk consumption declines.[10] Non-dairy beverages are already being chosen as alternatives to meet the nutritional needs of children with a milk allergy or lactose intolerance, and they may also be in better accord with changing social and cultural preferences.

The study by Lee and colleagues also raises questions about the clarity of food labelling. Typically, nutrients are shown on food labels in terms of "% daily value" rather than the actual amount. Would more detailed information on food labels reduce misperceptions? The study will add impetus to the deliberations as Health Canada weighs the mandatory fortification of beverages and other foods with meeting the needs of Canadians.[3]

Given the limitations of their study, including selection bias and inability to make causal links owing to its design, further studies are required to test the association between non–cow's milk consumption and serum 25-hydroxyvitamin D levels using different research designs and involving older children and those at higher risk of vitamin D deficiency. Particular attention will need to be paid to the specific types of beverages consumed and their respective vitamin D content. Moreover, with the exception of goat's milk, beverages not fortified with vitamin D will also likely not contain calcium. If parents do not understand this connection, children may also be at risk of reduced calcium intake.

Future studies will hopefully clarify the need for improved labelling of fortified foods and the role of mandatory fortification to ensure healthy consumer choices. Health care professionals can then more easily recommend vitamin D supplements for those who cannot otherwise achieve recommended intakes. The take-home message from this important study is that all of us — health professionals and consumers — must be well informed about food fortification practices to ensure compliance with current recommendations.

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