

# Vitamin D deficiency rickets

March 2015

### Highlights

- Following a two-year study on vitamin D deficiency rickets (2002 to 2004), which led to heightened public awareness about rickets prevention, a one-time survey in 2015 demonstrated that rickets and severe symptomatic vitamin D deficiency continue to be diagnosed across Canada.
- Rare but serious outcomes included cardiomyopathy and respiratory distress. Three patients had seizures, one of whom died. A second patient with rickets died following a respiratory infection.

### Background

The results of a two-year CPSP study on vitamin D deficiency rickets (2002 to 2004) demonstrated that severe vitamin D deficiency and nutritional rickets were persistent problems among infants and children in Canada<sup>1</sup> despite Health Canada and Canadian Paediatric Society prevention guidelines.<sup>2</sup> This reinforced the message that vitamin D supplementation was essential to eradicate this serious but easily preventable disease. In March 2015, a CPSP one-time survey was conducted to assess whether vitamin D deficiency rickets remains prevalent in Canada and obtain a better understanding of the barriers to prevention.

### Results

The frequency of symptomatic vitamin D deficiency and rickets was assessed through the CPSP, and the one-time survey identified barriers to the implementation of prevention guidelines. Vitamin D deficiency rickets was defined as a serum 25-hydroxyvitamin D level <25 nmol/L plus radiographic signs of rickets. Severe, symptomatic vitamin D deficiency (without rickets) was defined as a 25-hydroxyvitamin D level <25 nmol/L plus associated signs and symptoms, such as seizures, hypocalcemia, and fractures. Participating paediatricians reported on cases that were identified between March 2014 and March 2015.

A total of 671 paediatricians participated in the survey and the response rate was 27%, consistent with other one-time CPSP surveys. Of these, 58 (9%) paediatricians reported a total of 149 cases: 48 had nutritional rickets and 101 had severe, symptomatic vitamin D deficiency without rickets. For those presenting with rickets, 67% were aged 0 to 2 years, 23% were 3 to 8 years, and 10% were 9 years and older. For those presenting with severe, symptomatic vitamin D deficiency, 26% were aged 0 to 2 years, 26% were 3 to 8 years, and 48% were 9 years and older. The majority of cases were located in Alberta, Manitoba, Ontario, and Quebec.

Patients presented with skeletal deformity (13%), hypotonia/weakness (14%), delayed motor milestones (11%), failure to thrive (9%), irritability (7%), fractures (5%), and poor or delayed dentition (3%). More rare but serious outcomes included cardiomyopathy (1%) and respiratory distress (1%). Three patients presented with seizures, one of whom died. Another infant was identified with vitamin D deficiency rickets following post-mortem examination for sudden infant death syndrome (with cause of death being pneumonia).

In the initial vitamin D deficiency rickets study, the vast majority of confirmed cases were infants and toddlers with intermediate and dark skin, who had been exclusively breast-fed without appropriate vitamin D supplementation. This survey showed that high-risk groups go beyond dark-skinned breast-fed infants and include infants and children receiving milk or formula and those unable to afford vitamin D supplementation.

Patient risk factors included: darker skin; lack of sun exposure and vitamin D supplementation; recent immigration to Canada; developmental delay; feeding challenges due to prematurity; food allergies and dietary restrictions (including dairy); and maternal vitamin D deficiency. Barriers to effective vitamin D supplementation included health care providers' lack of promotion of the CPS recommendations, lack of supplementation, non-compliance, parents' disagreement with the need for supplementation, inability to afford vitamin D supplementation, language barriers, high cost of fortified milk in Northern communities, and spitting out the supplement. Ten percent of the reporting paediatricians noted that they were not aware of the CPS guidelines for rickets and severe vitamin D deficiency prevention.

### Conclusion

- Symptomatic vitamin D deficiency and rickets are persistent in Canada and continue to be linked to serious health outcomes.
- A lack of health care providers' awareness of the CPS guidelines and caregivers' non-compliance are persistent barriers.
- High-risk groups go beyond dark-skinned breast-fed infants and include infants and children receiving milk or formula and those unable to afford vitamin D supplementation.
- Additional strategies that place prevention in the hands of mandated public health policy makers now merit consideration.

### References

References 1 and 2 are available upon request from the CPSP office.

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