

How Should We Manage Vitamin D Deficiency Rickets?

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Despite considerable concern being expressed by health professionals about the almost global distribution and high prevalence of vitamin D deficiency among communities [1,2], there are few trials that have evaluated the efficacy of various treatment regimens against one another for the prevention or management of vitamin D deficiency rickets in children. In this issue, Gupta and his colleagues [3] have assessed the efficacy of two different levels of Stoss therapy, to not only treat vitamin D rickets but also to correct the vitamin D status, of young children. They concluded that both 300,000 IU and 600,000 IU vitamin D₃ as single day doses were equally effective in treating children between 6 months and 5 years of age with vitamin D deficiency rickets, but that neither dose was able to normalize the vitamin D status of the children – 3 months after the administered dose. Although no adverse clinical events were detected during the course of the study, a small number of children had asymptomatic hypercalcemia at 4 weeks or 3 months.

Although the management, both of vitamin D deficiency rickets, and of maintaining an adequate vitamin D status, is theoretically straight forward, as all that is required is a daily dose of vitamin D – which will vary in size depending on whether one is correcting vitamin D deficiency or maintaining vitamin D status – the realities are very different. A number of studies in both developed and developing countries have highlighted difficulties in ensuring patient treatment adherence, which is likely to be particularly problematic in the prevention strategies [4,5]. Thus in discussing possible options for management, it is appropriate to discuss the treatment of vitamin D deficiency separately from that used for the prevention of vitamin D deficiency.

Single dose treatment (Stoss therapy) for vitamin D deficiency rickets makes considerable sense as it ensures patient compliance and reduces the risk of incorrect dosage being administered by the caregiver; however, there is no consensus among health providers as to what is the most appropriate dose. A single day dose between

300,000 IU and 600,000 IU vitamin D₂ or D₃ given orally or intramuscularly has been recommended [6], but asymptomatic hypercalcemia and hypercalciuria have been reported by a number of researchers [3,7,8]. Lower doses of between 150,000 IU and 200,000 IU have also resulted in rapid healing of the biochemical and radiological abnormalities of rickets without the adverse effects [7,9,10]. Although further studies may be required to confirm the efficacy of 150,000 IU as a treatment dose, health professionals should in the meantime be cautious about using higher doses of vitamin D (such as 600,000 IU), especially in young children, in light of the reported adverse effects.

The prevention of vitamin D deficiency at a population level requires a concerted effort from public health specialists. Although the use of daily supplements is effective for individual subjects, who are at risk of vitamin D deficiency, it is unlikely to address the problem in communities or segments of communities at-risk (such as infants and young children, teenagers, and pregnant women). Intermittent vitamin D supplementation [11,12] or appropriate food fortification [13] should be considered. The possibility of combining intermittent vitamin D supplements with the immunization schedule would allow for targeting of young children, while providing supplements (100,000 IU) every three to four months at high school would target adolescents [14]. Although the use of intermittent therapy makes considerable practical sense at a public health level, Hollis and Wagner provide a cautionary note that the actual circulating concentrations of the parent compound itself (vitamin D) might play an important role in the vitamin D endocrine/autocrine system [15], and thus they suggest that daily treatment regimens may have different effects in comparison to those using intermittent regimens. As yet, empirical information is limited, but we should be aware of the possibility of different outcomes depending on the frequency of vitamin D supplementation.

With all the highly sophisticated technologies and

advances that are available and have been made in clinical medicine, the failure to eradicate vitamin D deficiency and particularly rickets is an indictment on the health professionals' and national governments' commitment to address the problem. Perhaps now that research is suggesting that a poor vitamin D status might have consequences on the health of adults, our legislators might pay more attention to eradicating vitamin D deficiency.

Funding: None; *Competing interests:* None stated.

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Is Single Oral Dose of 300,000 IU Vitamin D3 Adequate for Treatment of Nutritional Rickets?

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Nutritional Rickets has recently re-emerged as a problem in many countries where it was thought to have been eradicated [1]. Recent analysis shows that hospitalization rates for rickets in England are now the highest in five decades [2].

Still, many modern clinicians in developed countries have little experience or training in the management of this condition. The study published in this issue [3] is helpful in highlighting the efficacy of a simple single dose

regimen, and shows that the lower dose of 300,000 units is not inferior to double this dose. It is also important to stress that the dose is effective orally. Many children are treated with the same dose by intra-muscular injection which is painful and unnecessary. This study shows good clinical outcomes, and is in line with other clinical and pharmacokinetic studies showing effectiveness of oral Vitamin D therapy [4,5]. The practice of injecting children should stop, except for rare instances – such as