

Odds are that You are not Getting Enough Vitamin D...!

Vitamin D deficiency has become one of the major health challenges worldwide in all age groups and ethnicities. It is now believed that nearly everyone is low in this very important vitamin that is not just linked to calcium metabolism and bone mineralisation but also plays a critical role in guarding against several chronic diseases, such as diabetes, hypertension, metabolic syndrome, cancer, autoimmune and infectious diseases, among others (1, 2).

Reports suggest that 36% of healthy adolescents and 57% of adults in the US are having vitamin D inadequacy (3). Several other studies have estimated that one billion people worldwide, across all ethnicities and age groups are having deficiency in vitamin D levels (4). However, going by recent findings, the rate of true vitamin D deficiency is likely even higher, because it was observed that the previously recommended levels of vitamin D were actually too low. This has warranted designating optimal supplementation of vitamin D (5).

So, what the Commotion is all about?

In a recently published perspective on vitamin D deficiency, Papadimitriou, MD, PhD, from University of Athens School of Medicine, Athens highlighted the urgency of considering designating vitamin D levels ≥ 100 nmol/L as the RDA (recommended dietary allowance) (i.e. the average daily level of intake sufficient to meet the nutrient requirements of nearly all healthy people, presuming minimal sun exposure) intake levels, which corresponds to at least the three-fourths of the levels proposed by the Endocrine Society Expert Committee recommendations in 2011 (5).

As per these recommendations, vitamin D levels ≥ 100 nmol/L is considered as safe upper tolerable daily intake dose for vitamin D deficient patients (i.e. < 50 nmol/L). In terms of International Units (IU), it could lead to recommendations as follows:

Age Group	Recommended Dietary Allowance
Infants (up to 6 months) on enriched formula	1000 IU
Breastfed Infants (from 6 months to 1 year)	1500 IU
Children > 1 year of age	3000 IU
Young adults and thereafter	Up to 8000 IU

Rationale that Accentuate the Need for Vitamin D Dose Revision

In the published paper, Dr. Papadimitriou has highlighted the following observations that underscore the need and urgency of revising RDA for vitamin D supplementation:

- In Finland, incidence of type I diabetes in children aged 1–4 years increased by 350%, by 100% in those aged 5–9 years, and by 50% in those aged 10–14 years when daily dose of vitamin D supplementation was gradually reduced from 4000–5000 IU in 1964 to 400 IU in 1992 (6)
- A plateau effect was observed with the incidence of type I diabetes in Finnish children since 2006, and even decreased once the authorities decided to fortify all dietary milk products with cholecalciferol (a type of vitamin D, also known as vitamin D3) (7)
- Several studies have demonstrated the significant role of higher levels of vitamin D supplementation in negating incidence of type I diabetes (8), improving insulin secretion (9), and protection against β -cell destruction (10)
- Reanalysis of the data used by the Institute of Medicine to estimate the RDA for vitamin D suggested that in fact to achieve values ≥ 50 nmol/L in 97.5% of individuals, 8895 IU/day of vitamin D was required (11), which was further corroborated by Heaney et al. (12) when they found that to achieve the Endocrine Society’s recommended levels of 75 and 100 nmol/L, a dosage of 6201 IU/day and 9122 IU/day, respectively were needed
- In a largest meta-analysis ever carried out on all studies involving all-cause mortality related to serum 25(OH)D, the major circulating form of vitamin D, it was witnessed that 25(OH)D levels < 75 nmol/L may be too low for safety and associated with higher rate of all-cause mortality—thus demolishing the U-shape curve of mortality related to vitamin D levels, as assumed previously (13)

Urge to Public Health Authorities to Consider the Dose Revision

The high prevalence of vitamin D deficiency is now considered as a pandemic and has become an independent risk factor for total mortality in the general population. It is believed that our daily diet is contributing only 20% to our vitamin D reserve, whereas remaining 80% is obtained through sun exposure. However, given our modern diet (poorly loaded with wild fish and eggs, and fresh milk), indoor lifestyle (i.e. both children playing and adults working indoors all day long), and use of skin-protective cosmetics (to protect it from rising incidence rates of skin cancer) it would be a major challenge to overcome this insufficiency going forward.

Hence, the author of the paper urges all the concerned public health authorities to consider targeting for serum vitamin D levels ≥ 100 nmol/L as safe upper tolerable daily intake doses to treat patients having vitamin D insufficiency. However, the author also suggests that these recommended doses can be individualized depending upon various factors like dietary and sun exposure habits and the geographical conditions, and may be body mass index (BMI), age, skin color taken into consideration during dose adjustment.

From the safety point of view, particularly in pediatric population, recommended doses (as listed in the table above) can be given safely without medical supervision just to treat vitamin D deficiency as per Endocrine Society's clinical practice guidelines.

Conclusion

It is now clearer than ever that this 'sunshine vitamin' not just prevents rickets but also imparts greater than expected health benefits to an individual. In addition, reduced overall public health burden can be ensured by maintaining optimal vitamin D status. Hence, as evident from the available data, above proposed dose levels would be sufficient to maintain serum levels of vitamin D around or over 75–100 nmol/L with zero risk of toxicity—thus ensuring much-needed protection against threats posed by vitamin D deficiency worldwide.

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