

Vitamin D Deficiency in Indian Scenario - An Overview

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Abstract: Vitamin D deficiency is pandemic, widespread in individuals irrespective of their age, gender, race and geography. It is the most under-diagnosed and under-treated nutritional deficiency in the world. Vitamin D is photosynthesized in the skin on exposure to UVB rays. However, vitamin D deficiency is widely prevalent despite plentiful sunshine even in tropical countries like India. This article discusses about the status of vitamin D in India and also the underlying causes for this epidemic and preventive strategies to be followed.

Keywords: Food fortification, Supplements, Vitamin D, Vitamin D deficiency, .

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I. Introduction

Vitamin D deficiency is highly prevalent in both urban and rural settings, and across all socioeconomic and geographic strata in India. Indians get most of their vitamin D through adequate sun exposure; however, darker skin pigmentation and the changes which have accompanied India's modernization, including increased hours spent working indoors and Indian socio religious and cultural practices do not facilitate adequate sun exposure.¹ Inadequate sun exposure results in reduced vitamin D synthesis and ultimately poor vitamin D status persists. Dietary vitamin D intake is very low in India because of low consumption of vitamin D rich foods, absence of fortification and low use of supplements. Consequently, subclinical Vitamin D deficiency is likely to play an important role in the very high prevalence of rickets, osteoporosis, cardiovascular diseases, diabetes, cancer and infections such as tuberculosis in India.²

1.1 Risk factors

Some of the risk factors causing low serum vitamin D are

1. Children and aged persons, pregnant and nursing women
2. Obese people
3. Lack of sun exposure
4. Anyone with a malabsorption syndrome, such as cystic fibrosis, Crohn's disease, or inflammatory bowel disease
 1. People with chronic kidney disease, liver failure
 2. People taking antiseizure medications, glucocorticoids, AIDS drugs, or antifungal drugs
 3. Reduced skin synthesis,
 4. Sunscreen usage blocks 99% of skin synthesis
5. Traditional clothing, Urbanization, Reduced Exercise.³

Normal Vitamin D level in serum⁴

Vitamin D status	US Institute of Medicine classification (ng/ml)	US Endocrine society classification (ng/ml)
Severe deficiency	< 5	<20
Deficiency	<15	21-29
sufficiency	>20	>30
Toxicity	>50	>150

1.2 Prevalence

Studies conducted in India among various socio-economic groups, different ages, and both genders as well as different disease states report widespread vitamin D deficiency / insufficiency in the country (Harinarayan & Joshi, 2009; Harinarayan et al, 1995). The prevalence ranges from 70-90% (Goswami et al,

2000; Harinarayan et al, 2011; Marwaha et al, 2011).⁵ In North India (27°N), 96% of neonates, 91% of healthy school girls, 78% of healthy hospital staff and 84% of pregnant women were found to have low vitamin D. In South India (13°N), hypovitaminosis D is equally prevalent among different population groups and also among rural and urban subjects, but in some studies, urban subjects are found to be more deficient.⁶

1.3 Problems associated with vitamin D deficiency

1. It has found to be associated with the advancement of cancers, for example; breast,
2. colon, ovarian, and prostate
3. Mental disorders like depression, autism
4. Increased risk of fracture
5. Migraine, Muscle aches and weakness
6. Rickets, Osteomalacia, Osteoporosis
7. Periodontitis, local inflammatory bone loss that can result in tooth loss
8. Cardiovascular disease,
9. Type 2 diabetes mellitus,
10. Autoimmune disorders.⁷

Preventive strategies to correct hypovitaminosis D.

Exposure to sunlight gives 90% of vitamin D between 10 am to 3pm. Holick estimates exposure of the body in a bathing suit to 1 minimal erythemal dose equals about 20,000 units. Thus, exposure of arms and legs to 0.5 MED approximates ingesting 3000 units of vitamin D.⁸ From diet such as Milk, yogurt, butter, mushroom, fatty fish like tuna, mackerel, and salmon, foods fortified with vitamin D, like some dairy products, orange juice, soy milk, and cereals, beef liver, cheese., egg yolk should be taken.⁹ Traditional multivitamins contain about 400 IU of vitamin D, but many multivitamins now contain 800 to 1000 IU. A variety of options are available for individual vitamin D supplements, including capsules, injections, chewable tablets, liquids, drops, granules and transdermal cream.¹⁰ In our country like India with large population with deficient vitamin D status, can be corrected either by vitamin D fortification or supplementation.

Fortification of food with vitamin D by intake

Vitamin D fortification is an effective and passive way to increase vitamin D intake in both general population and vulnerable. Milk curd and yogurt, infant formulas, butter, ghee, oils, processed cheese, soy milk, soy curd (tofu), orange juice, mango juice, wheat flour, rice and rice flour may be suitable vehicles for fortification strategies in the Indian scenario. Consumers can improve and maintain vitamin D status through increased consumption of natural or fortified food sources or vitamin D-containing dietary supplements and planned exposure to sunlight and regular physical exercise.¹¹ There is urgent need to prioritize development of national level programs to make available, quality-regulated, affordable vitamin D supplements and vitamin D fortified foods to the Indian populace. The government needs to educate the people about the current status of vitamin D in India and also the modes to attain vitamin D sufficiency. The curricula of medical colleges need to be updated pertaining vitamin D status of the Indian population and information pertaining vitamin D, and its skeletal and extraskeletal benefits is required.

Vitamin D supplements

Affordable, good quality and readily available vitamin D supplements for the masses are needed. Vitamin D supplements should be made available at all primary care health centers to pregnant women, lactating women and noon meal centres for students.

Fortification of foods with vitamin D in India

Fortification of food with vitamin D is desirable by political and administration's will and support. Involvement of the food industry by encouraging private enterprises operating at the national and local level is required. Government should extend support to research groups, to provide a comprehensive picture of the ongoing vitamin D problem so that the impact of supplementation programs and fortification strategies in actual practice may be studied and monitored. The effect of a partnership between the government, healthcare system, industry and consumers, aimed at improving the vitamin D status in India.¹²

II. Conclusion

There is a significant potential for the reduced risk and prevention of multiple chronic diseases and broad health benefits with correction of vitamin D deficiency. Current policies for vitamin D supplementation and fortification are inadequate in India and new guidelines with effective legislation should be available to improve vitamin D status.

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