

Vitamin D deficiency: It's contributing factors and prevention

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A B S T R A C T

Vitamin D deficiency is prevalent across the globe. The most important role of vitamin D is in strengthening the bones. Besides this, vitamin D is likely to be associated with prevention against different types of cancers and chronic diseases like cardiovascular diseases, hypertension, diabetes mellitus and stroke as well as osteoporosis. It also has role in preventing many neurological diseases like depression, chronic fatigue syndrome and neuro-degenerative diseases including Alzheimer's disease autoimmune diseases, birth defects and periodontal diseases. Main source of vitamin D is sunlight, also called sunshine vitamin. People with old age, dark skinned and obese cannot produce sufficient amount of Vitamin D. Food sources include fatty fish, animal liver, egg yolk and dairy products, though these are poor sources. Vitamin D deficiency is endemic in Pakistan, India, Sri Lanka as well as Middle Eastern Countries. Though it's sunny there all the year round, still the bulk of population is vitamin D deficient due to limited sun exposure in extremes of high temperature and socio religious reasons. Similarly, population in Europe and America are also affected. Pregnant mothers and infants are more at risk. Population at risk should be screened and treated. Appropriate health policies, public awareness, and fortification of dairy products can definitely prevent as well as address this huge burden of disease.

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Introduction

Vitamin D deficiency and insufficiency is an important health issue worldwide in all age groups. With the recent medical advances globally, vitamin D deficiency is still prevalent. Approximately a billion people worldwide are either vitamin D deficient or insufficient.¹ Vitamin D, also called "Sun Shine Vitamin" is a steroid with hormone like activity. Unlike other vitamins, vitamin D functions like a hormone and every cell of human body has receptors of it and is necessary for growth and development. There are two forms of vitamin D. Vitamin D₂ and vitamin D₃.² Bulk of vitamin D is produced by sun light following exposure of skin to ultraviolet rays. The usual healthy diet contains very little vitamin D. Important dietary sources are fatty fish as salmon, mackerel and oils from fish, including cod liver oil, fortified dairy products, egg yolk, liver of animal.³ Human body needs enough stores of vitamin D for prevention of diseases. Studies show a link between vitamin D deficiency and CV diseases including stroke and myocardial infarction. Besides type 2 diabetes

mellitus, dementia, different type cancers, multiple sclerosis, irritable bowel syndrome and obesity.^{4,5}

Vitamin D levels can be diagnosed by testing blood for 25-hydroxyvitamin D or 25(OH)D. Normal levels of vitamin D is defined as a 25(OH)D concentration greater than 20 ng/mL (50 nmol/L), insufficiency is 12 to 20 ng/mL (30 to 50 nmol/L) while deficiency is <12 ng/mL (30 nmol/L).⁶ For prevention of vitamin D deficiency, the best way is to have sun light exposure at noon for two hours daily, with 40% of body exposed without applying sunscreen. Dark-skinned persons, obese, elderly, those live inside home majority of time and smokers cannot produce sufficient amount of vitamin D. Since it is difficult to get enough exposure to vitamin D through sunlight and food sources, it is recommended to consume 1,000 to 2,000 IU of vitamin D₃ supplement daily.⁷

Studies have reported in the United States, about 50% to 60% of people residing in nursing home and

hospitalized patients had vitamin D deficiency.⁸ Similarly 61% of the elderly population is vitamin D deficient in United States. In Turkey 90% population, in India 96%, 72% in Pakistan, and 67% in Iran were found vitamin D deficient or insufficient.⁹ A retrospective review was done in Scotland confirmed that cardiomyopathy is reversible with quick identification and vitamin D supplementation. In this regard public health policy in the United Kingdom lacks in preventing the children who are Vitamin D deficient or insufficient.¹⁰ Globally middle eastern countries have sunshine almost whole of the year, allowing vitamin D synthesis, but the population of these countries have lowest levels of vitamin D on global perspective. Vitamin D deficiency affects individuals across all life stages but most vulnerable are pregnant women, neonates, infants, children under five years of age and the elderly. Furthermore, while rickets is almost eliminated from developed countries, it is still prevalent in several of the Middle East countries.¹¹

In a study carried out in Qassim province of Saudi Arabia reported 28% study subjects were vitamin D deficient, 39% were vitamin D insufficient and 33% had normal vitamin D level. Main symptom of vitamin D deficiency were bone pain and fatigue.¹² Irrespective of age and gender of study subjects, results of a study carried out in a tertiary care setting of Abbottabad demonstrated high prevalence of vitamin D deficiency.¹³ It was also found in a study carried out in Karachi significant decreased levels of Vitamin D in patients complaining of generalized body ache even without any other health problem. The affected mainly the middle-aged female population.¹⁴ Similarly, prevalence of vitamin D deficiency was 78.3% in 1244 healthy individuals in Sindh Province in Hyderabad city of Pakistan.¹⁵ Daily doses of vitamin D supplements decreased total mortality rates as indicated in Meta-analysis of 18 randomized controlled among 57,000 study subjects.¹⁶ In the Women's Health Initiative, calcium and vitamin D supplementation decreased the risk of breast cancer and colorectal cancer.¹⁷ Long term strategies to address this deficiency problem should include public awareness campaigns, national health policy for better screening facilities of population at risk and prevention through food fortification. In developed countries cooking oil is fortified with Vitamin A & D, on same manner dairy products as milk, yoghurt etc. should

also be fortified. Vitamin D supplementation program should be initiated for vulnerable population as pregnant women, infants, children under five years of age and elderly population.^{18, 19}

In conclusion vitamin D deficiency is prevalent worldwide, no country exception to this. Keeping in mind the role of Vitamin D in the prevention of a large number of diseases, this issue is addressed with due attention and concrete steps at all levels of health care delivery.

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