Journal of Nutrition and Food Security
Shahid Sadoughi University of Medical Sciences
School of Public Health
Department of Nutrition
Nutrition & Food Security Research Center

eISSN: 2476-7425 pISSN: 2476-7417 JNFS 2017; 2(2): 135-137 Website: jnfs.ssu.ac.ir

Vitamin D Deficiency: A Neglected Truth in Iran

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ARTICLE INFO

EDITORIAL ARTICLE

Article history:
Received: 17 Nov2016
Revised: 21 Dec 2016
Accepted: 21 Jan 2017

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Vitamin D (vit D) is a fat-soluble steroid which includes two forms: vit D2 (ergocalciferol) and vit D3 (cholecalciferol). The former is provided from plant and the latter is taken from animal sources (Shao *et al.*, 2012). Vit D is obtained from natural synthesis in the skin and also from some dietary sources such as oily fish, eggs, fortified products (dairy, cereals, soy), and oral supplements (Jolfaie *et al.*, 2016, Kennel *et al.*, 2010). Finally, it is activated biologically during hydroxylation process in the liver and kidneys (Shao *et al.*, 2012).

Vit D has essential physiological functions for maintaining mineral homeostasis (Chung *et al.*, 2011). Indeed, vit D deficiency can contribute to several musculoskeletal disorders, such as rickets in children, osteomalacia, osteopenia, osteoporosis, and fractures in adults (Moher *et al.*, 2001). In addition, the association between vit D deficiency and many diseases including cancers, infections, autoimmune diseases, diabetes mellitus, and cardiovascular diseases have been studied (Hilger *et al.*, 2014, Norman, 2008). The normal level of 25(OH)D (the dominant vit D metabolite in circulation representing vit D status) is considered 20 ng/ml (50 nmol/L) and less than this value is classified into the deficiency category (Christodoulou *et al.*, 2013, DeLuca, 2004). The most important factors in deficiency of vit D are decreased sun exposure, insufficient vit D intake, and increase of age (Gaugris *et al.*, 2005). Moreover, high risk of vit D deficiency has been observed in special groups and conditions such as children, pregnant and postmenopausal women, as well as elderly people (Shao *et al.*, 2012); diseases associated with fat mal-absorption (e.g., Crohn's disease) (Kennel *et al.*, 2010); and disturbing conditions of parathyroid, liver, or kidney functions (Kathleen Mahan *et al.*, 2012).

This paper should be cited as: Ramezani-Jolfaie N, Salehi-Abargouei A. ***Vitamin D Deficiency: A Neglected Truth in Iran.*** *Journal of Nutrition and Food Security (JNFS)*, 2017; 2 (2): 135-137.

On the basis of current reports, there are approximately one billion people with vit D deficiency worldwide (Khadilkar and Khadilkar, 2013). In Iran, despite the fact that it is a sunny country, the high prevalence of vit D deficiency is a growing concern (Heshmat *et al.*, 2008). According to a population-based study in our country, the rate of vit D deficiency among women and men has been estimated to be about 75.1 % and 72.1%, respectively (Moradzadeh *et al.*, 2008). Furthermore, Yazd as a province in center of Iran is located in desert areas (in the latitude of 31.5^0) and is thus mostly sunny in the year, has prevalent vit D deficiency. Some studies have indicated that 60% of girl students and 78 % of medical staffs of Shahid Sadughi hospital had deficiency (Mehrdad *et al.*, 2009, Shakiba and Rafiei, 2009). As mentioned earlier, several studies indicated the association between vit D status and chronic diseases; however, in Iran the studies did not replicate these results. This might be cause by the fact that all participants had vit D deficiency and there was low variation between them in serum vit D levels. Frequent use of topical sunscreen by women and lack of vit D fortified foods might be some other reasons for high prevalence of vit D deficiency in Iran despite its sunny climate (Heshmat *et al.*, 2008).

Some recommendations have been suggested that can help to overcome this situation. Measurement of serum 25(OH)D levels regularly to identify the necessity of vit D supplementation. Daily sunscreen-free exposure to the sun (10-15 minutes) to provide vit D. Consumption of foods that naturally contain vit D (salmon, sardines mackerel, and cod liver oil). Consumption of fortified foods with vit D3 (e.g., fortified milk, orange juice, formulas, yogurts [100 IU/8 oz], cheeses [100 IU/3 oz], butter [56 IU/3.5 oz], margarine [429 IU/3.5 oz], and breakfast cereals [100 IU/serving]). Using vit D supplementation to treat vit D deficiency and maintenance therapy. In vit D supplementation mentioned above, the recommended supplementation doses were as the following: infants aged 0–1 year [2000 IU/d, 400-1000 IU/d], children aged 1–18 years [2000 IU/d, 600-1000 IU/d], adults [50,000 IU/week for 8 weeks, 1500–2000 IU/d]) (Holick *et al.*, 2011). Moreover, the results of meta-analysis studies indicated that 700-800 IU/d vit D supplementation can reduce the risk of fractures and bone loss in elderly people (Bischoff-Ferrari *et al.*, 2005, Tang *et al.*, 2007). The results of another meta-analysis also revealed that serum vit D levels are inversely associated with all-cause and cause-specific mortality which impose significant economic burden on the healthcare system (Chowdhury *et al.*, 2014, Schöttker *et al.*, 2014). According to findings of the study conducted on Canadian population, the economic burden could be decreased to 7.3% (4.0-10.5%) or $14.4 billion ($8.0–$20.1 billion) if the mean serum vit D concentration increases to 105 nmol/L (Grant *et al.*, 2010). Therefore, regarding the importance of vit D effects on body health and subsequently health care system, it is necessary to pay special attention to vit D status in all age groups.

Authors' Contributions

Ramezani-Jolfaie N wrote the manuscript. Salehi-Abargouei A edited the manuscript. Both authors approved the content of the manuscript, and agreed for all aspects of the work.

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[DOR: 20.1001.1.24767417.2017.2.2.2.8]

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[DOR: 20.1001.1.24767417.2017.2.2.2.8]