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Vitamin D Deficiency: A Neglected Truth in Iran

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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 (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).

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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°) 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],

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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 cause-specific mortality which 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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