Assessment of Vitamin D Status in Healthy Volunteers

Abstract

A fat soluble vitamin, converted to a hormone in the body, itself known as vitamin D, which plays the crucial role during the regulation of calcium and phosphorus. Its worldwide deficiency has becomes a health issue, even after all medical advancement of the century and it is still epidemic. More than a billion populations, all over the world are vitamin D deficient. About fifty to ninety percent of 25(OH) D is synthesized by ultraviolet-B rays in the skin and the remaining obtains from diet or supplements. Studies from different parts of India had reported the prevalence of vitamin D deficiency varying from 30% to 100 %. Vitamin D has both skeletal and non-skeletal functions in the body. The main role of vitamin D is to maintain adequate intestinal absorption of calcium and phosphorus and mineralization of bone. Vitamin D play many roles in our body for example in bones, it has many functions in cells, immune response, cell differentiation and proliferation and apoptosis. It also decreases the risk of many diseases such as cancers, autoimmune disease, infectious disease and cardiovascular diseases. Populations at high risk for deficiency include the elderly, adolescents, people with darker skin, those who are obese, and those with limited sun exposure. The production of vitamin D is dependent on many factors like sun exposure, its duration and time of exposure, skin pigmentation, latitude, air pollution and clothing etc. During the exposure to sunlight the humans get ultraviolet-B (UVB: 295-310) rays which helps in synthesis of cholecalciferol (Vitamin D3). In liver vitamin D is hydroxylated to its circulating form, 25-hydroxy vitamin D which is converted in the kidney into the biologically active form (1,25-dihydroxy vitamin D). The present study was carried out in Biochemistry Department at Maharishi Markandeshwar Institute of Medical Sciences & Research, Mullana, Ambala, Haryana. Among the total 200 study subjects, 115 (57.5%) were found with vitamin D deficiency, 133 (66.5%) calcium deficiency, 14 (7%) phosphorous deficiency. 4 (2%) alkaline phosphatase deficiency, Only 1 (0.5%) and 5 (2.5%) were found with deficiency of progesterone and testosterone respectively. Mean ± SD of age of the entire subjects (200) was 39.51 ± 10.97 years and the Mean ±SD of vitamin D, calcium, phosphorous, alkaline phosphatase, estrogen, progesterone and testosterone were found to be 29.55 ± 8.60ng/ml, 8.42 ± 1.10 mg/dl, 3.74 ± 0.66 mg/dl, 60.01 ± 27.58 IU/L, 61.45 ± 32.70
pg/ml, 0.53 ± 0.22 ng/ml and 2.84 ± 2.84 ng/ml respectively. The correlation coefficient (r), among phosphorus, alkaline phosphatase, estrogen and progesterone with respect to age were observed statistically significant (p≤0.05) and the levels of vitamin D were found with significant correlation (p≤0.05) with respect to variations in the levels of calcium, phosphorous, estrogen and progesterone in vitamin D deficient subjects (115). The association of 25(OH) D levels were found statistically significant (p<0.05) with milk (p=0.00) consumption, cereal with milk (p=0.001), cheese on pizza / toast (p=0.00), bread (p=0.000), fish (p=0.045), consumption of meat (p=0.027), consumption of yoghurt (p=0.001), consumption of butter (p=0.00) and consumption of cheese (p=0.000) of all study subjects. Furthermore, the association of 25(OH) D levels was found not statistically significant (p>0.05) with consumption of tea / coffee (p=0.394), consumption of eggs (p=0.180), consumption of cereal (p=0.494) and consumption of pudding (p=0.430) of all study subjects. The association of vitamin D level were also found statistically significant (p=0.000) with sun light exposure and urban / rural background on the basis of their skin color. Cod liver oil, oily fish, ultraviolet-B radiation, milk and mushrooms are the only natural source. It was found that there is elevated prevalence of vitamin D deficiency in the local population of north-east Haryana across different demographic characteristics. It is apparent that the deficiency of vitamin D has high prevalence in the population of Haryana. It is concluded from the present study that it is advisable to increase present dietary recommendation of vitamin D among all population and the best treatment is that the advice of sun exposure for at-least 10-30 minutes between 10 AM to 2 PM.

Key words: Vitamin D, sun-exposure, UV-B, skin color, urban and rural, calcium, phosphorus, alkaline phosphatase, estrogen, progesterone, testosterone, milk, tea or coffee, Cheese,bread, fish, meat, yoghurt, butter, egg, cereal and pudding.