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Prevalence of vitamin D deficiency among the Jordanian population

K. B. AL-JAABARI
M. M. QUEISI
S. AL-ZABEN
M. B. ABU-ZAID
S. O. AMARIN

Jordan Society for Medical Laboratory Sciences

Introduction

Vitamin D is a group of fat soluble prohormones. The two major forms of which are vitamin D2 (or ergocalceferol) and vitamin D3 (or cholecalciferol). The term vitamin D also refers to metabolites and other analogous of these substances (1). Vitamin D is synthesized from 7-dehydrochlesterol in the skin exposed to sunlight, especially ultraviolet B radiation (2, 3, 4). Vitamin D plays an important role in the maintenance of organ system (5). It regulates the calcium and phosphorus levels in the blood by promoting re-absorption of calcium in the kidney. It is needed for bone growth and bone remodeling by osteoblasts and oesteoclasts (6, 7). Vitamin D (D2, D3 and metabolites) is converted to 25-hydroxy vitamins (25-OH D) in the liver.

Vitamin D is now recognized as a factor which has multiple roles in maintaining optimal health (8, 11, 34, and 35). Serum concentration of 25 hydroxyvitamin D (25-(OH) D) is the best indicator of vitamins D status. It reflects vitamin D produced cutaneously and that obtained from food and supplements (9) and has fairly long half-life of 15 days (10). However, serum 25-(OH) D levels do not indicate the amount of vitamin D stored in other tissues. Therefore our study aims at assessing the prevalence of vitamin D deficiency among the Jordanian population especially those referred to the Royal medical services (RMS) clinics by measuring the levels of 25-(OH) D in their serum, because the measurement of circulating 25 (OH) D is becoming increasingly important and the clinical demand for 25 (OH) D assay has risen substantially.

Methodology

This study has been conducted on the Jordanian population during the period between 2008 and 2012. A total of 882 subjects were included in our study, 742 were females and 140 were males, their age ranged between 18 and 70 years. Blood samples were drawn from all subjects and screened to determine the level of 25-Hydroxyvitamin D (25-(OH) D. We used LIASON 25 OH Vitamin D TOTAL assay from Diasorin company to measure the concentration of 25 (OH) D. This assay is a direct competitive chemiluminescence immunoassay (CLIA) for quantitative determination of total 25 OH vitamin D in serum or plasma.

Results

According to the review of the literature which suggests the classification of 25 OH Vitamin D status, which classify it into three categories, Vitamin D deficiency with <10 ng/ml (<25 nmol/ L), Vitamin D insufficiency with 10-30 ng/ml (75-250 nmol/L) and Vitamin D sufficiency with >100 ng/ml (>250 nmol). Our results revealed 440 Females with a prevalence of 59.3% are deficient for vitamin D, 135 females with a prevalence of 18.2% are insufficient for vitamin D and 58 males with a prevalence of 41% are insufficient for vitamin D. A total of

249 females and males out of 882 were sufficient for vitamin D with a prevalence of 28%. 167 were females with a prevalence of 22.5% and 82 male with a prevalence of 58.6%. The optimal level of 25-OH vitamin D is subject to some debate, but > 32 ng/ml (>80 nmol/L) is accepted as sufficient for bone for health (12-16,33), accordingly 633 out of 882 of the subject screened are vitamin D deficient with prevalence of 72%. The number of females deficient for vitamin D was 575 out of 742 with a prevalence of 77.5% among females, while 58 out of 140 of males were vitamin D deficient with a prevalence of 41% among males.

Discussion and Conclusion

A recent growing public health problem is vitamin D insufficiency. The assessment of vitamin D status, though the measurement of 25 (OH) D in serum or plasma, has received attention in the last decade. Several research studies have identified widespread vitamin D insufficiency in apparent healthy population world-wide (11-16), it is estimated that one billion people in the world are currently vitamin D deficient (19). In our study we have found a very high prevalence of vitamin D deficiency, particularly among females. Our investigation showed that 77.5% of the female were either deficient or insufficient of vitamin D, while among males the prevalence of vitamin D deficiency is 41% which is about two-fold lower than the female. The higher rate of deficiency in females compared to men may be associated with insufficient exposure of women to sunlight compared to men, in addition extensive covering with clothing and failure to spend time outdoor. In general deficiency of vitamin D can result from a number of factors including intake coupled with inadequate sunlight exposure, disorders that limit its absorption, conditions that impair conversion of vitamin D into active metabolites, such as liver or kidney disorders and body characteristics such as skin color and body fat (5). Deficiency results in impaired bone mineralization, and leads to bone softening disease (17,18,26) including Rickets, Osteomalacia, and Osteoporosis. As well as vitamin D malnutrition may also be linked to an increased susceptibility to several diseases such as high blood pressure, tuberculosis, cancer, periodontal disease, multiple sclerosis, chronic pain, seasonal effective disease (20-25), peripheral artery disease (27,28,29) and several autoimmune diseases including type 1 diabetes (30). Vitamin D deficiency is very common, a recent survey in the UK showed that more than the half of the population in the UK has insufficient levels of vitamin D, in spring about 1 in 6 people has severe deficiency, it is also estimated that about 9 in 10 adults of South Asian origin may be vitamin D deficient (31), as well our investigation showed that vitamin D deficiency is common among the Jordanian population with high prevalence (72%). Most of affected people either don't have any symptoms, or have vague aches and pains, and unaware of the problem. Therefore it's important to screen all the population to identify them whether they are deficient or sufficient for vitamin D to avoid consequence complications of vitamin D deficiency.

Recommendation

Sun exposure is needed to maintain adequate blood levels of vitamin D, it has been suggested by some vitamin D researchers that 5-30 minutes of sun exposure between 10 AM and 3 PM at least twice a week without sunscreen usually lead to sufficient vitamins D synthesis. If one regularly avoided sunlight exposure, research indicates a necessity to supplement with at least 5,000 units (IU) of vitamin D daily (32). The best nutrition sources of D3 are only first primary salmon, tuna and mackerel (9). Vitamin D2's nutrition sources are from some vegetables, yeast and fungus. The vegetarian diet is abundant in the D2 (33-34). Additional information may be required for diagnosis, assay results should be utilized in conjunction with clinical laboratory data to assist the clinician in making individual patient management decisions in an adult population.

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