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Vitamin D Deficiency and Insufficiency in Patients Attending a General Hospital in Dubai, United Arab Emirates

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Abstract

Background: Vitamin D deficiency is a common medical problem, especially in the gulf region of the Middle East. The prevalence in several studies has exceeded 50% and being more frequent among females. **Objective:** We assessed the prevalence of vitamin D deficiency in patients attending a general hospital in both men and women in different age groups. **Methods:** Vitamin D level data for patients who attended Dubai hospital in the period between 2008 and 2012 were examined retrospectively. The serum 25(OH) D levels were crosschecked in patients' charts and the hlaboratory electronic database. Patients with incomplete medical records, those already on treatment with vitamin D, and patients with contradicting results in the medical files and the electronic database has been excluded. Data were analysed using descriptive analysis relating vitamin D levels to age, gender, and ethnicity. **Results:** The total number included was 2836 patients. 81% of them had 25 (OH) D levels of <30 ng/ml. About 76.4% (n=2166) of the studied group were females. There was no difference in prevalence between males and females. Arab ethnicity was associated with more marked vitamin D deficiency and less sufficiency. **Conclusion:** We conclude that vitamin D deficiency is a considerably major health problem in the emirate of Dubai. Higher awareness among healthcare providers and the community is needed for screening and treatment necessity.

Key words: Vitamin D deficiency, Vitamin D insufficiency, Bone Health,

Introduction

Vitamin D (25(OH)D3) plays a pivotal role in calcium homeostasis. It increases intestinal absorption of calcium and phosphorus and decreases phosphorus excretion from the kidneys; thus maintaining serum calcium and phosphorus homeostasis is important for bone mineralization (1,2). The main source of 25 (OH) D3 is endogenous synthesis

in the skin from 7-dehydrocholesterol upon exposure to wavelengths 290-320nM of UVB from sunlight. 7-dehydrocholesterol is converted to precholecalciferol, which in turn is converted to cholecalciferol through a process of thermal isomerization (2). Numerous studies evaluated the vitamin D status in communities globally and in the Middle East region (3-5). Logically, 25 (OH) D3 levels are expected to be normal in areas where there is abundant sun light all through the year. In reality, data from Arabian Gulf countries and the Middle East have shown the opposite i.e. surprisingly high prevalence of vitamin D deficiency (3-5). The prevalence of vitamin D deficiency (defined as 25 (OH) D3 level <30ng/ml) in a group of health care professionals was about 96.5%. Severe vitamin D deficiency (defined as 25(OH) D3 levels <3 ng/ml) occurred in 20% (3). The prevalence of vitamin D deficiency was found in 36% of women of childbearing age in Arab communities from Al-Ain, UAE, (4). Similar rates of vitamin D deficiency were reported from other countries in the region. In Iran, prevalence of 25 (OH) D3 <20 ng/ml was 72.1% in females and 18.3% in males and in the same study, prevalence of 25 (OH) D3 <32 ng/ml was 95.2% in females and 49% in males (5). Vitamin D deficiency in this region was attributed to the fact that endogenous synthesis of vitamin D3 is dependent on many factors, which include the time and duration of exposure to sun light, skin color and texture, season, latitude, as well as socioeconomic factors (6-8).

Circulating 25(OH) D is used to assess vitamin D status being a stable pro-hormone which is minimally affected by biologic variability (10). The American Association of Clinical Endocrinologists has recently defined vitamin D deficiency at 25(OH) D <20 ng/ml, and insufficiency at levels between 20-30 ng/ml, while sufficiency is diagnosed with 25(OH) D levels >30ng/dl (10). The lack of sun exposure in a huge number of the population, rarity of vitamin D in the commonly consumed foods necessitate the prompt diagnosis of 25(OH) D deficiency and supplementation even in people who do not have any obvious associated comorbidities. We conducted this retrospective analysis of vitamin D status in patients attending a general hospital in the city of Dubai (UAE) over a period of 4 years to opportunistically evaluate the size of the problem in populations that may not be suspected to suffer it.

Patients and Methods

Objectives

Primarily we wished to assess the prevalence of vitamin D deficiency in patients attending a government general hospital (Dubai hospital). Secondarily, we wanted to evaluate further the specific prevalence in males and females separately, prevalence at different age groups and in different ethnic groups.

Study Design and Population

We included all patients who had their 25(OH) D checked during the period of June 2008 to June 2012. To ensure accuracy of the data, we crosschecked patients' charts and the electronic database (SAM) system. All data were transferred into a data collection form. Variables included demographic, clinical and laboratory characteristics. Patients with incomplete medical records, and those already on treatment with vitamin D, either vitamin D2 or D3, and patients with contradicting results in medical files and the electronic database were excluded from the study.

Biochemical Analysis

During the entire study period between years 2008-2012, all vitamin D measurements were performed locally at a single biochemistry laboratory in Dubai Hospital. A radioimmunoassay method (Diasource, Louvain-la-Neuve, Belgium) was used with standard internal and external quality assurance practices. Vitamin D deficiency was defined as a 25(OH) D below 20 ng/ml, insufficiency as a 25(OH) D of 21–29 ng/ml, and sufficiency as a 25(OH) D of 30–100 ng/ml in accordance with the guidelines of The Endocrine Society, USA (10).

Results

A total of 2736 patients were included in the study. Of these, 76% were UAE nationals. 2166 (76%) were females. 69% of the patients were in the age group of 30-70 years. The age and gender distribution is further detailed in Table 1.
Most of the patients (63.9%) had vitamin deficiency (25(OH) D levels <20ng/ml). 17.9% had vitamin D insufficiency, whereas vitamin D sufficiency was evident in 18.1 percent of the studied sample (Table 2). The vitamin D deficiency tended to be more marked in males; mean 25(OH) D was 18.6±12.4 ng/ml in males and in females 20.6±16.5ng/ml, but the difference did not quite reach statistical significance.

The mean 25(OH) D in different age groups is summarized in table 2. 88% of patients between 19-30 years had levels <30 ng/ml compared to 81% in those between 30-50, 80% in those between 50-70 years, and 82% in those >70 years of age.

Table 1. Demographics of the study population presented in terms of age groups for all patients and each gender separately. They are expressed as numbers (percentage)

Age groups	All Patients	Male Patients	Female Patients
10-30 years	474 (17%)	106 (16%)	368 (17%)
30-50 years	1002 (35%)	158 (24%)	844 (39%)
50-70 years	968 (34%)	292(44%)	676 (31%)
>70 years	392 (14%)	114 (17%)	278 (13%)
All ages	2836	670	2166

Table 2. Vitamin D status in the study population expressed in terms of age groups, severity and gender*

Age Groups	Numbers of patients in each 25(OH)D status category			Mean ± SD of serum 25(OH)D level	
	<20 ng/ml	20-30	>30	Males	Females
10-30 years	358	55	61	15.4 ± 9.0	16.3 ± 14.6
30-50 years	647	160	195	17.8 ± 11.7	20.7 ± 15.7
50-70 years	572	208	188	20.3 ± 12.7	22.5 ± 17.8
>70 years	236	86	70	18.7 ± 14.4	22.1 ± 17.0

**Vitamin D status expressed in terms of the numbers of patients within each vitamin D status category (<20,20-30 and >30) per three age groups (30-50, 50-70 and >70 years) and also expressed in terms of mean ± SD of circulating 25(OH)D in males and females separately per the same age groups.*

The majority of patients (85%) were Arabs, the remaining 15% are non-Arabs. 81.8% of the Arabs had a 25(OH) D level <30 ng/ml, and only 18.6% had levels above 30ng/ml. Whereas, non-Arabs had 25(OH) D levels <30 in 76.8% and 25(OH) D levels >30 ng/ml in 23.2% [Fisher's Exact Test P= 0.0165 for Arabs vs non Arabs].

Discussion

The composite prevalence of vitamin D deficiency and insufficiency [as defined by the endocrine society] in patients attending Dubai hospital was found to be very high (81.9%). This is clearly a reflection of many social, religious, and environmental factors resulting in inadequate exposure to the sun (11). About 14 % of our sample were more than 70 years. 25(OH) D deficiency and insufficiency levels were found in 82.1% of this age group. This is compatible with findings of other studies in which prevalence of 25(OH) D deficiency in homebound elderly people, even though they were mostly on vitamin D replacement therapy, was found to be around 38-54% (12). In our cohort, 80.5% of the younger age group (10-30 years) had mean 25(OH) D of 15.0±9.0 ng/ml in males and 16.3±14.6 ng/ml in females. These levels are lower than those reported in young healthy adults from Abu Dhabi (13). The prevalence of 25(OH) D deficiency in our population seems to be high compared to other studies in the region. The prevalence vitamin D deficiency in 200 volunteers from eastern Saudi Arabia aged 25-35 years was found to be 25% (14). In those older than 50 years, the same investigators reported a prevalence of vitamin D deficiency of 37% (18). In relation to the ethnicity difference, our study have shown a higher prevalence of 25(OH) D deficiency in Arabs in comparison to the non-Arabic population.

Being a retrospective study that carries all inherent limitations and pitfalls of such a design, we believe excluding patients with hyperthyroidism, and mal-absorption would have given more accurate information of vitamin D prevalence. Assessment of seasonal variations would be less accurate in a retrospective design and such assessment is best evaluated in a well-designed prospective study. Notwithstanding that, the present study was meant as an assessment of vitamin D status in people attending hospital services in real life. Furthermore, our major advantage is the large sample size. To our knowledge, none of the studies ever published in vitamin D prevalence had included this number of patients.

In conclusion, the prevalence of vitamin D deficiency and insufficiency is very high in population of Dubai city represented by this sample from patients attending Dubai hospital. The overall prevalence of insufficiency and deficiency might be the highest indices in the region. We propose a more liberal screening strategy is appropriate for our patients and general population that screens more patients than just high-risk groups at least once or if needed periodically. Nevertheless, public awareness of vitamin D deficiency needs to be efficiently raised by dedicated, collaborative efforts of concerned clinicians and public health workers.

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