Vitamin D status in health care professionals in Qatar

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ABSTRACT

الأهداف: لمعرفة نسبة عوز فيتامين د بين العاملين في المهن الطبية في مؤسسة حمد الطبية واطباء مؤسسة حمد الطبية في قطر.

الطريقة: خلال الفترة من 15 يناير 2007 إلى 15 يناير 2008 اشتملت هذه الدراسة على 340 موظف متطوع. أكمل كل فرد مذكرة لتحديد مدة ووقت التعرض لأشعة الشمس و فيما إذا كان المشترك يتناول أي عقار يحتوي على فيتامين د. وقد تم معايرة فيتامين د 25 (هيدروكسي فيتامين د) وهرمون جارات الدرق (PTH) وايونات الكالسيوم والفوسفور والبروتين الكلي والالبومين وخميرة الفوسفور القلوية.

النتائج: كان متوسط نسبة معايرة فيتامين د 11.7 نغ\مل مع تباين بين الإناث حيث كانت أقل (10.3 نغ\ مل) مقارنة مع الذكور (13.7 نغ\مل)، ولقد وجدنا ان 97% من المشتركين كانت لديهم النسبه أقل من 30نغ\مل و87% اقل من 20 نغ\مل.

خاتمة: أن نسبة عوز فيتامين د في وسط السلك الطبي في قطر كانت عالية جدا.

Objectives: To investigate the prevalence of vitamin D deficiency among health care professionals working at Hamad Medical Corporation in Doha, Qatar.

Methods: Between 15th January 2007 and 15th January 2008, 340 healthy volunteers were included in this study. Each subject completed a diary to determine the duration of sunlight exposure, and vitamin D supplements. Serum levels of 25-hydroxyvitamin D (25OHD), parathyroid hormone (PTH), calcium, phosphorus, alkaline phosphatase, total protein, and albumin were obtained. Those with abnormal results were called for counselling.

Results: The mean overall vitamin D level was 11.7 ng/ml. It was lower in females (10.3 ng/ml) than in males (13.7 ng/ml). Ninety-seven percent of all participants had a mean level <30 ng/ml. Eighty-seven percent had a mean level of <20 ng/ml.

Conclusion: We concluded that the prevalence of vitamin D deficiency among health care professionals in Qatar is very high.

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The deficiency of vitamin D is quite prevalent in many areas and different population groups.[1-7] High prevalence of vitamin D deficiency was found in countries with plenty of sunlight such as Saudi Arabia, United Arab Emirates, India, Australia, and Qatar.[8-12] Our previous data in 360 patients with different rheumatic diseases in the rheumatology outpatient clinic showed that 60% of them were vitamin D deficient (vitamin D <20 ng/ml).[12] Little is known on the level of vitamin D in health care professionals. One may assume that health care professionals may be less likely to have vitamin D deficiency as generally, health care professionals are more aware of the situation of vitamin D and thus are expected to take some action to avoid being deficient. This study aims to find out the prevalence of Vitamin D deficiency among physicians and nurses working at Hamad Medical Corporation in Qatar. This is the largest health care facility in Qatar with 1500 bed capacity. Qatar is a state in the Arabian Gulf; it is a rapidly developing country with a diverse multi ethnic population. The weather in Qatar is warm or hot throughout the year with plenty of sunlight almost daily.

Methods. This observational study was conducted at Hamad Medical Corporation, Doha-Qatar, between 15th January 2007 and 15th January 2008. Physicians and nurses working at Hamad Medical Corporation were invited to participate in the study by local announcement. All participants were healthy and ambulatory. Subjects with chronic illness or recent hospitalization were excluded. All subjects provided written informed consent. Each participant completed a diary on the duration of sunlight exposure and vitamin D supplements. Fasting venous blood samples were obtained and serum levels of calcium, phosphorus, alkaline phosphatase, total protein, and albumin were measured on the same day while frozen plasma samples were kept for measurement of 25-hydroxyvitamin D, and parathyroid hormone (PTH) levels. Descriptive statistic methods were used to analyze the results. This study was approved by the Research Committee, Hamad Medical Corporation (HMC), Doha, Qatar for ethical issues on 15th January 2007 under project number 391/06.

The mean and standard deviation for continues variables and frequency distribution with percentages for categorical variables were used in this study. Student t-test and one-way analysis of variance were applied to obtained the significant levels of vitamin D according to different categories. Correlation coefficient was calculated to attain the association between vitamin D levels and PTH. A p value of 0.05 was considered as statistically significant level. Statistical Package for Social Sciences Version 14.0 was used for the analysis.

Results. Three hundred forty health care professionals participated in the study, 204 females (60%) and 136 males (40%). The mean age was 40.8 years for males and 35.9 years for females. The mean overall vitamin D level was 11.7 ng/ml. The mean level for females and males are summarized in **Table 1** (96.5% of the study sample had vitamin D level of <30 ng/ml, 87% had vitamin D level of <20 ng/ml, while 54.7% had severe deficiency with a level of ≤10 ng/ml, and 20% had vitamin D below the lower limit of detection [3 ng/ml]). Further, analysis considering gender showed that 11% of males and 26% of females had vitamin D level <3 ng/ml. **Table 2** shows the percentage of subjects in each category of vitamin D. There was a modest, but significant inverse correlation between serum PTH and 25-hydroxyvitamin D levels, the mean ± SD serum PTH level was 47.9 ± 18.8 pg/ml. Twenty-eight of the 340 participants (8.2%) were taking vitamin D supplement with modest, but significantly rise in the mean 25-hydroxyvitamin D level, 17.8 ng/ml compared with 11.2 ng/ml (p=0.008) who were not taking vitamin D supplement. Serum levels of calcium, phosphorus, alkaline phosphates, and serum albumen showed non-significant correlation with vitamin D level. One hundred twenty-four participants (36.5%) reported average daily time spent outdoors >1.0 hour, 116 (34.1%) less than half-an-hour, and 100 (29.4%) no sun exposure. There was unexpectedly poor correlation with vitamin D level.

Discussion. Vitamin D plays an important role in diverse physiologic functions in addition to its role in bone homeostasis.[13-15] Receptors for vitamin D were found in a variety of cells and tissues. Therefore, the likely disturbances due to vitamin D deficiency and the therapeutic potential of vitamin D were expanding. Epidemiological studies revealed a negative association between vitamin D level and a wide range of diseases; some examples include metabolic diseases such as type 1 diabetes mellitus; neurologic diseases such as multiple sclerosis; rheumatologic diseases such as rheumatoid arthritis; neoplastic diseases such as breast cancer; and even cardiovascular diseases.[14-16] In addition, there is an association with mortality from cancer colon and severity of rheumatoid arthritis.[17] Therapeutic use of vitamin D derivative for the treatment of psoriasis is well

Table 2 - Percentage of subjects in each category of vitamin D.

Vitamin D level (ng/ml)	Males	Females
>30 (desirable)	5	2
20 - <30 (insufficiency)	10.5	8.9
10 - <20 (mild deficiency)	43.4	25.1
<10 (severe deficiency)	30	38
<3 below detection level	11	26

Table 1 - Demographic characteristics and mean vitamin D, parathyroid hormone (PTH), calcium, phosphorus and alkaline phosphates levels.

Gender	n (%)	Age (years)	Vitamin D (ng/ml) (30 - 80 ng/ml)	PTH (9-65 pg/ml)	Calcium (2.02 - 2.60 mmol/L)	Phosph-orus (0.87 - 1.45 mmol/L)	Alkaline phosphates (50 – 130 u/l)
Males	136 (40)	40.8	13.7	45.2	2.3	1.28	73.5
Females	204 (60)	35.9	10.3	49.7	2.3	1.25	67.4
Total	340 (100)	37.9	11.7	47.9	2.31	1.26	69.8

established, and the role of vitamin D in prevention and treatment of some of the previously mentioned diseases were investigated, but definitely more work is needed. Adequacy of vitamin D is usually measured by the circulating levels of 25-hydroxyvitamin D. Although there is no universal agreement on the optimal level of vitamin D, there is a sound reason to consider that serum level need to be ≥30 ng/ml (75 mmol/l),[18-20] at this level there well be no rise in PTH, and hence bone turn over will not be abnormal. Some experts classified vitamin D status into insufficiency from 20 to <30 ng/ml, deficiency between 10 ng/ml and 20 ng/ml, and severe deficiency <10 ng/ml.

Several studies on vitamin D level in different countries have clearly demonstrated the magnitude of the problem and being a global public health problem. In a study by Plontikoff et al,[21] in their Minnesota-based study had deficient levels of vitamin D on patients with non-specific musculoskeletal pain and it was found that 100% of African Americans, East Africans, Hispanics, and American had deficient levels of vitamin D (≤20 ng/ml). Vasikaran et al[22] found that 34% of blood donors (age 18-67 years) in Australia had vitamin D of <20 ng/ml. In a study by Tangpricha et al,[23] they observed that 36% of young adults are vitamin D deficient reflecting that wide distribution of vitamin D deficiency even among young people. Vitamin D deficiency is common in the middle East. Woodhouse et al[24] reported a low vitamin D level in Saudi Arabia population despite sunny days are almost all year round. In recent study by Sadat-Ali et al,[25] they found 25-37% of healthy Saudi men have vitamin D deficiency. Saadi et al[26] studied Emirati females and concluded that vitamin D deficiency is highly prevalent in Emirati women and appears largely attributable to insufficient sunlight exposure.

This study was conducted in health professionals including physicians and nurses. The mean age was 40.8 years. The study revealed that 96.5% of them having vitamin D <30 ng/ml, 20% of them having vitamin D level below the detectable limit of <3 ng/ml. This is an extremely high prevalence of vitamin D deficiency among young ambulatory individuals with no musculoskeletal complaints. Participants with low vitamin D level were called for counselling and treatment. Very few studies conducted on health care professionals are reported in the literature. In Boston Medical Center, it was observed that 32% of healthy students, physicians, and residents were found to be vitamin D deficient, despite drinking a glass of milk and taking a multivitamin daily and eating salmon at least once a week.[23] Another study by Jancin[27] on 35 internal medicine house staff at Oregon Health Sciences University, Portland, revealed that 51.4% of them were vitamin D deficient.[27] Only 8.2% of the studied individuals in our study were taking the supplement of vitamin D (as multivitamin tablets containing 400 international units [IU] in each tablet; one to 2 tablets daily as a nutritional supplement), which resulted in significant difference in vitamin D compared to individuals who were not taking vitamin D supplement, but still their vitamin D levels were below the normal (30 ng/ml). This raises the concern that current recommendation of vitamin D supplement is probably not adequate. In a study on pregnant and lactating women who were thought to be immune to vitamin D deficiency since they took a daily prenatal multivitamin containing 400 IU of vitamin D (70% took a prenatal vitamin, 90% ate fish, and 93% drink approximately 2.3 glasses of milk per day); 73% of the women and 80% of their infants were vitamin D deficient (25-hydroxyvitamin D level, <20 ng per milliliter) at the time of birth.[28] Only 34% of our studied individuals reported an average daily time spent outdoor of more than hour and their vitamin D did not differ from others who reported spending less time outdoors. This could be because they are spending this time in the shade or not getting enough exposure to the sun. Serum levels of calcium, phosphorus, alkaline phosphatase, and albumen were not sufficiently reliable in predicting hypovitaminosis D. In this study, the mean serum levels of all these parameters were within the normal range. In a study by Smith et al,[29] it was found that routine measurement of the levels of calcium; phosphorus, and alkaline phosphatase are not reliable predictors of hypovitaminosis D, this was also the case even when vitamin D insufficiency has produced a PTH response. Some of their patients also had normal level of PTH despite being very deficient in vitamin D with level <3 ng/ml.

The limitations of study are the small number, young age of the studied group, and that they are not population-based so the findings might not reflect the actual incidence of vitamin D deficiency in the population as a whole, but they could be significant.

In conclusion, vitamin D deficiency/insufficiency is a global public health problem not only limited to high risk groups of elderly or housebound females, but also young physicians and nurses (shows that this study) have an alarmingly high prevalence of vitamin D deficiency. Our finding confirms the wide spread prevalence of vitamin D deficiency and the need for a population wide policy to solve this problem.

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Related topics

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