



## Understanding the Relation between Outdoor and Indoor Life Style and the Hypovitaminosis in a Year-Round Sunny Area

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### Abstract

Individuals with hypovitaminosis D were studied based their life style as they were of a predominantly an indoor (group 1) or, outdoor style (group 2) or of both (group 3). All were resident of Abu Dhabi (UAE), which is a year -round sunny area. Interestingly, the outcome was not discriminatory as far as the mean values of 25 (OH) D3 and total calcium, and the prevalence of Secondary Hyperparathyroidism (SHPTH) are concerned. They were not different in the 3 groups. The results hence, cast doubts on the impact of the life style on vitamin D inadequacy in this locality and further conclude that merely living in sunny areas does not safeguard against the occurrence of hypovitaminosis D.

**Purpose:** This report is an attempt to extrapolate more understanding of the relationship between the daily outdoor or indoor life style among patients with hypovitaminosis D (<27 ng/ml) in Abu Dhabi area where the vitamin inadequacy is a very common problem despite the year-round sunny environment.

**Methods:** Data presented here belong to outpatient adult patients (different socioeconomic classes) in whom the diagnosis of hypovitaminosis D was made based on the assay of 25 OH D3 of <27 ng/ml. Patients were requested to describe their daily activity as being predominantly indoors ( group 1, G1) or outdoors (group 2, G2) or both (group 3, G3).

**Results:** After enrolling 150 patients sequentially, the number in G1 outnumbered the other 2 groups individually or collectively (79.5% vs. 8% & 12.5%) respectively,  $p=0.0001$ . Interestingly, the mean of 25(OH) D3 and calcium, as well as the prevalence of secondary hyperparathyroidism (SHPT) were not different in the 3 groups. Likewise was the mean age of the patients. No difference was met in the gender data in G1,  $p=NS$ , a marginal male predominance in G3,  $p=0.05$  but total absence of female gender in G2,  $p=0.0001$ .

**Conclusion:** Despite the fact that the majority of individuals tends to be indoor either circumstantially or deliberately avoiding excessive heat hence, the contribution of such relation does not seem to have an impact on the hypovitaminosis D status in this area. The outcome was not discriminatory. Studying the skin type scale and other potential lifestyle factors of these individuals may lead to more understanding of this multi-determinant condition.

**Keywords:** Hypovitaminosis D; Outdoor activity; Indoor activity

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### Introduction

Vitamin D can no longer be thought of as a nutrient necessary for prevention of rickets, osteomalacia or osteoporosis, rather it should be considered essential for overall health and well being. Low levels of vitamin D and decreased exposure to solar UV B radiation are associated with an elevated risk of number of chronic disorders including malignancies and metabolic conditions [1]. There is abundant evidence supporting the positive impact of outdoor activity/ exposure to solar UV B radiation on the levels of the vitamin D in different age groups. However, a variable response to that has been observed among different populations depending on their geographical locations, frequency of activity, period of exposure and ethnicity [2-5].

Abu Dhabi, the capital city of UAE enjoys sunny blue skies throughout the year with an average temperature of 34.46 C. The temperature between May-September is usually as high as 39.3°C-40.4°C. Generally, the residents do not prefer to expose themselves to sunlight in order to avoid the

intense heat.

## Methods

Data presented here belong to outpatient adult patients residing in Abu Dhabi (different socioeconomic classes) in whom the diagnosis of hypovitaminosis D was made based on a level of <27 ng/ml for 25 OH D3 using electrochemiluminescence immunoassay, ELCIA method. In addition, their serum calcium by (ion colorimetric assay) and intact PTH by (electrochemiluminescence immunoassay, ELCIA) were also estimated. All patients were requested to describe or categorize their daily activity (from morning until 3PM to 5 PM) as being predominantly or mostly (outdoor, indoor or both). Patients with chronic renal failure or chronic liver disease or on corticosteroids treatment were not included here.

## Results

After collecting 150 patients information it became apparent that the trend of the patients groups will not change markedly by collecting more individuals for the study. The majority 119 (79.5%) were leading a predominantly indoor life style (G1) vs. 12 only of outdoor life style (8%)(G2) and 19 of both (indoor and outdoor activities) (12.5%), (G3) together  $P=0.0001$ . Individuals from various Arab states formed the bulk (76.5%) of patients. Gender data showed no difference in G1 ( $F=66$  vs.  $M=53$ ),  $P=0.119$ , but with higher tendency to male predominance in G3 ( $M=13$  vs.  $F=6$ ),  $P=0.05$  and total absence of females in G2 (12 vs. 0)  $P=0.0001$ . The mean age was not different in the three groups respectively (39+/-12.8 in G1, 40.8+/-10.5 in G2, & 35.4+/- 11.6 .4 years in G3),  $P_s=NS$ .

Interestingly, the mean of 25(OH) D was (17.5+/- 5.64 in G1 vs. 16.3+/-6.42 in G2,  $P=0.48$ , 17.5+/-5.64 in G1 vs. 17.6+/-7.92 in G3,  $P=0.99$  & 16.+/-6.42 in G2 vs. 17.6+/-7.92 ng /ml in G3  $P=0.65$ . 12% of the patients were deficient for the vitamin; <10ng/ml (12% in G1, 8.5% in G2 and 16% in G3,  $P_s=NS$ ). The mean serum of Calcium was, (9.63+/-0.55 in G1, 9.85 +/-0.50 in G2 & 9.68+/-0.52 mg /dL in G3) respectively,  $P_s=NS$ . 29 patients (19.5%) expressed secondary hyperparathyroidism (SHPTH); parathormone levels of >65 ng/ml. The prevalence of (SHPTH) was also not different in the groups, (19.5% in G1, 16.5% in G2 and 21% in G3) respectively,  $P_s=NS$ . Likewise, when the same data of G1 were compared to those of G2 & G3 collectively, the  $P_s=NS$ .

## Discussion

High prevalence of vitamin D insufficiency has been repeatedly reported in individuals residing in the sunny UAE. In earlier surveys of both genders (adults and children) involving 587 individuals some 80.5% had vitamin D inadequacy with close prevalence between genders (82.5% in females and 77% in males) (6). Higher figures obtained in subsequent report involving 315 adults where by males surprisingly, exhibited higher prevalence of inadequacy (<30 ng/ml) of 99% vs. 91.5% in females. Yet, females were more vitamin deficient (<12 ng/ml) than males [7]. The study ensured that the patients included were not on vitamin D supplementation. Reasons for the vitamin inadequacy were not specifically sought however. A conclusion drawn from another study focusing on various dress styles of females in relation to the hypovitaminosis D was that, the pattern and longevity of dress styles should not be used as pretext for the vitamin inadequacy before other factors are being examined or sought as well. Hypovitaminosis D was present in 90.5% of those 255 women included [8]. The work presented here

came as complementary to those previous studies. Our findings, are somewhat different in the sense that the selection was based on patients with hypovitaminosis D aiming only to identify differences between the levels of 25 OH D in relation to their indoor / outdoor activity. After sequentially collecting the data of 150 patients, it became clear that patients who were predominantly conducting daily indoor activity (G1) have in fact outnumbered the other groups, thus it was rather implausible to gain more useful conclusions had we continued collecting further cases. Levels of hypovitaminosis D whether due to insufficiency or deficiency were not different among the 3 groups hence indicating that all were at the same risk for vitamin inadequacy regardless to the type of daily activity. Although, many patients prefer to stay indoor deliberately to avoid the outdoor heat others as well conduct their indoor activities because of the nature of their occupation and the working hours. Of interest though, was the gender feature of the study with a tendency among males to conduct both life styles versus a total absence of outdoor activity among females who very few of them conducted both activities also. This in part can be attributed to the socio-cultural makeup of the community. Finally, in order to obtain more reliable data relevant to the in and outdoor activities, one has to study certain subgroup/s rather than relying on a discrete and open outpatients population. In this regard, certain subgroups/s of profession based on outdoor environment should be targeted.

## Conclusion

Despite the fact that the majority of individuals tends to be indoors either circumstantially or deliberately avoiding excessive heat hence, the contribution of such relation does not seem to have an impact on the hypovitaminosis D status in this area. The outcome was not discriminatory. Therefore, merely living in sunny areas does not safeguard against hypovitaminosis D. Other life style factors need also to be explored for a better understanding of this multi-determinant condition.

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