



## SUNLIGHT AND VITAMIN D; A GLOBAL PERSPECTIVE FOR HEALTH

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**ABSTRACT** **Background:** There has been renewed interest in vitamin D, since numerous recent studies have suggested that besides its well-established roles in bone metabolism and immunity, vitamin D status is inversely associated with the incidence of several diseases, e.g., cancers, cardio-vascular diseases, and neuro degenerative diseases. **Objectives:** Studies have shown high rates Vitamin D deficiency (25-hydroxyvitamin D) affects in India despite appreciable levels of sunlight. Public health strategies are needed to address high deficiency rates, including food fortification and nurture (increasing exposure to sunlight). **Methods:** Blood sampling among 1184 randomly selected citizens. **Results:** Amongst the selected citizens, 19.93% had 25 hydroxy Vitamin D deficiency, 60.81% had insufficiency and 19.25% had normal Vitamin D. **Conclusions:** Public health strategies are needed to address the public regarding the importance of Vitamin D deficiency, insufficiency and emphasizing the addition of the same in the diet.

**KEYWORDS :** 25-hydroxyvitamin-D, vitamin D deficiency, Insufficiency

## INTRODUCTION

India is known for its traditional, cultural and lingual diversity and it is a tropical country. Majority of its population lives in area as receiving sample sunlight throughout the year and hence there was disbelief that Vitamin D deficiency is uncommon in India.

Vitamin D is a fat soluble vitamin and its synthesis in the body is dependent on multiple factors like latitude, atmospheric pollution, clothing, skin pigmentation and duration and time of exposure to sunlight. The WHO Expert Consultation<sup>5</sup> states that in most locations of the world between 42° N and 42°S latitude there is abundant sunshine (1). This is responsible for physiological production of Vitamin D endogenously in the skin from 7-dehydrocholesterol present in the subcutaneous fat. Dress code, skin pigmentation, and application of sun protection factor (SPF) of 15 reduce the UVB penetration into epidermis by > 95%, thereby limiting the production of previtamin D<sub>3</sub> by the skin. Thirty minutes of exposure of the skin over the arms and face to sunlight, without application of sunscreen, preferably between 10 am to 2 pm (as maximum ultraviolet B rays are transmitted during this time) daily is adequate to avoid Vitamin D deficiency. Casual exposure to solar radiation wavelengths 290–315 nm results in the cutaneous production of pre vitD<sub>3</sub>.1, 2). During sun exposure the UVB photons (290–315 nm) that enter the epidermis cause a photo chemical transformation of 7dehydrocholesterol (7-DHC) (pro vitamin D<sub>3</sub>) to pre vitamin D<sub>3</sub>. However from the data available in the published literature, Vit D deficiency is very common in India in all the age groups and both sexes across the country (1-3).

Vitamin D is a part of the “Calcium-Vitamin D-Parathyroid hormone” endocrine axis.(2) It is crucial for calcium metabolism and its homeostasis. Adequate calcium intake along with vit D is necessary to maintain the peak bone mass achieved by an individual. Vitamin D adequacy during adolescence helps to reduce the risk of osteoporosis later in life. Vit D deficiency and low calcium intake are important risk factors for osteoporosis (4,5). Besides its well-established roles in bone metabolism and immunity, vitamin D status is inversely associated with the incidence of several diseases, e.g., cancers, cardio-vascular diseases, and neurodegenerative diseases (4-6).

In India, the cultural and social taboos affect the lifestyle of the individuals. Most of the people of the country are pure vegetarians and the others are underprivileged. These two factors affect the nutritional status leading to the vitamin deficiency in the individuals. Also, the clothing of the individuals will limit the sun exposure and ultimately aggravating the vitamin D deficiency.

Surprisingly, there is very little data on factors that affect absorption of

this fat-soluble vitamin, although it is acknowledged that dietary vitamin D could help to fight against the sub deficient vitamin D status that is common in several populations. Additionally, vitamin D deficiency supplements are available but most Indians were unaware about their requirement of vitamin D.

Thus the aim of this paper is to encounter the gravity of the vitamin D deficiency problem in and around Bangalore, so that the physicians take necessary caution and care in the diagnosis and treatment of Vitamin D deficiency.

## MATERIALS AND METHODS:

It is important to note that the studies which have reported an increased prevalence of vitamin D deficiency in India have taken the cut-off limits as follows:

Deficiency: <10ng/ml;      Insufficiency: 10-30ng/ml  
Sufficiency: 30-100ng/ml      Toxicity: >100ng/ml

In order to study the prevalence of vitamin D deficiency, a total number of 1184, in the age group between 20-70 yrs of normal healthy urban adult subjects of both the sex (F=842, M=342) of Bowring and lady Curzon hospital, Bangalore, were selected and their serum for 25(OH) vitamin D was estimated by chemiluminiscent micro particle immunoassay (CMIA) method.

## Statistic analysis

The obtained data were analyzed by one way ANOVA using SPSS software, version 20 (IBM SPSS Statistics, 20, US). The p-value <0.05 is considered significant.

## RESULTS:

## Distribution of patients according to vitamin D levels.

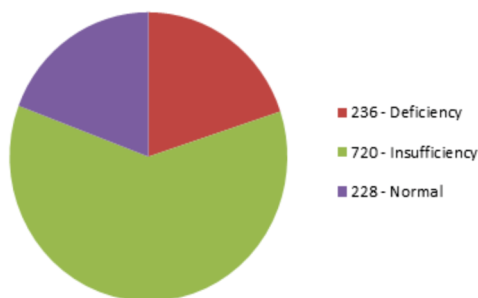
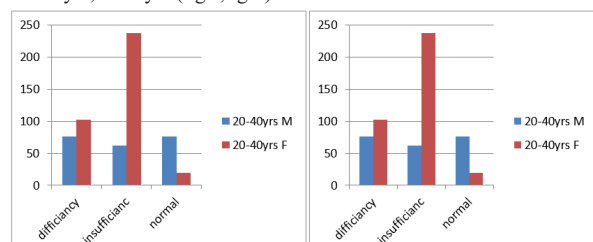


Fig no 1 shows that the prevalence of vitamin D level of 1184 samples, 236 were deficient <10 ng/ml, (19.93%) and the Insufficiency of vitamin D level (10-30ng/ml) were 60.81% (720) and the remaining normal (30-100ng/ml) were 19.25% (228).

In the present study we have studied 25(OH) D in both the sex of age 20-40 yrs, 41-60 yrs. (fig 2, fig 3).



## DISCUSSION:

Vitamin D deficiency is not only a problem in India but also in countries like Pakistan, China, middle-East and Africa. Although we are all aware about the causes of Vitamin D deficiency, we are still lacking in preventing it. Although, there is adequate sunshine in India, high temperatures during the daytime and sultry and humid climate in many areas are the deterrents to follow the Advice about sun exposure. Hence, food fortification with Vitamin D is a good option to solve this issue. Similarly food fortification and public health policies for Vitamin D supplementation and dietary guidelines for adequate calcium for Indian population should be formulated and implemented (7-9).

The prevalence of vitamin D level in Bangalore city reports 19.93% is deficient, 60.81% are insufficient and 19.25% are normal. An interesting findings observed in this study is the deficiency and insufficiency of 25(OH) D are more significant in females ( $p < 0.001$ ) than males. Further it was observed that insufficiency of 25(OH) D is more significant in females of age group 41-60yrs than deficient females ( $p < 0.001$ ).

As per the report of International Osteoporosis Foundation, in North India, 96% of neonates, 91% of healthy school girls, 78% of healthy hospital staff, and 84% of pregnant women were found to have hypovitaminosis D (7-9). On the other hand, prevalence of vitamin D deficiency in southern India was reported by many authors (4, 7-9).

## CONCLUSIONS:

It is said that "Prevention is better than cure". This is true for Vit D insufficiency and deficiency which are easily preventable. Thus, the current recommendations of taking 1 to 1.5 gm of dietary calcium and 2000 IU of Vitamin D per day in the diet should be adhered to avoid Vitamin D deficiency in the Indian population

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