

Deficiency of Vitamin D in Urban Poulation of Central Madhya Pradesh

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Abstract

Introduction: Vitamin D is popularly known as a sunshine hormone. Deficiency of Vitamin D is very common and one of the major vitamin deficiency in the Indian subcontinent and is a profound health issue in India. In India, lack of Vitamin D is stated to affect nearly 90% of the apparently healthy individuals probably because of poor exposure to sunlight and poor dietary intake. The study was aimed to study the incidence of Vitamin D deficiency in urban population of central Madhya Pradesh. *Materials and Methods:* The study included patients coming to our diagnostic centre for Vitamin D testing, 500 patients of ages ranging from 0 to more than 80 years and both males and females were part of the study. Vitamin D estimation was performed by CLIA method on Advia Centaur XP (Siemens) fully automated immunoassay analyser. The guidelines provided by Endocrine Society Clinical Practice Guidelines on evaluation, treatment and prevention of Vitamin D deficiency (2011) was used as a basis to classify vitamin D results into deficiency, insufficiency and sufficiency levels. *Results:* A total of 500 patients of both the sexes and all ages were included in this study. There were 228 (45.6%) males and 272 (54.4%) females. The male to female ratio was 0.83:1. Vitamin D deficiency was observed in 336 (67.2%) patients and insufficiency was seen in 83 (16.6%) patients. *Conclusion:* Deficiency of Vitamin D is a public health problem specially in urban population. A public private partnership model with awareness programmes and affordable testing facility will help in detection of Vitamin D deficiency.

Keywords: Vitamin D; Deficiency; Insufficiency; Toxicity

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Introduction

Vitamin D was earlier grouped in the vitamin class in the early half of the 20th century but later on it was called a prohormone. [1,2]. It is popularly known as a sunshine hormone as its synthesis

depends upon exposure of skin to sunlight.

Vitamin D plays a crucial role in maintaining calcium balance and is required for optimal skeletal health. Its major role is to facilitate the calcium absorption from the small intestine. Maximum calcium absorption takes place at Vitamin D levels

above 32 ng/ml [3]. Proper mineralization of bone requires adequate absorption of calcium and phosphorous from the intestine.

Vitamin D consists of 25 (OH) Vitamin D or ergocalciferol and 1,25 (OH) Vitamin D or Vitamin D₃, which is synthesized by the skin or obtained from dietary sources. In the skin, ultraviolet light catalyses the conversion of 7 Dehydrocholesterol to Vitamin D₃ which is released in the blood stream in a bound form [4,5, 6]. In the liver it forms 25 (OH) vitamin D, followed by formation of 1,25 (OH) vitamin D in the kidney. Vitamin D or 25 (OH) vitamin D is the most useful parameter for assessing the vitamin D status of the body [7].

The incidence of Vitamin D deficiency is reported throughout the globe both in countries where sunlight is ample as well as in countries devoid of sufficient sunlight. But it is mostly not diagnosed and hence not treated throughout the world [8,9]. Vitamin D deficiency is very common and one of the major vitamin deficiency in the Indian subcontinent and is a profound health issue in India [10,11].

Vitamin D plays a role in many cell functions and its deficiency leads to osteoporosis, osteomalacia, muscle weakness and increased risk of fractures in elderly, debilitated individuals. Its deficiency also leads to increased risk of developing hypertension, Diabetes mellitus, myocardial infarction and death due to cardiovascular diseases [12]. Vitamin D receptors are present in many cells like liver, pancreas, brain, lung, skin, muscle and lipocytes [13].

In India, lack of Vitamin D has been stated to affect nearly 90% of the apparently healthy individuals probably because of poor exposure to sunlight and poor dietary intake [14].

Our study was aimed to study the incidence of Vitamin D deficiency in urban population of central Madhya Pradesh.

Materials and Methods

This study included patients coming to our diagnostic centre for Vitamin D testing.

500 patients of ages ranging from 0 to more than 80 years and both males and females were included in the study. Patients with history of acute illness, cancer patients, hypertensive, diabetic patients and pregnant and lactating mothers were excluded from the study. Patients were divided into 0-20, 21-40, 41-60, 61-80 and > 80 years of age. Samples were collected in red top tubes by standard protocols and Vitamin D estimation was performed by CLIA method on Advia Centaur XP (Siemens) fully automated immunoassay analyser. The guidelines provided by Endocrine Society Clinical Practice Guidelines on evaluation, treatment and prevention of Vitamin D deficiency (2011) was used as a basis to classify vitamin D results into various categories i.e. Vitamin D deficiency when Vitamin D levels were below 20 ng/ml, insufficiency when Vitamin D levels were between 21-29 ng/ml and sufficiency when Vitamin D levels were above 30 ng/ml [15].

Results

A total of 500 patients of both the sexes and all ages were included in this study. There were 228 (45.6%) males and 272 (54.4%) females. With a M:F ratio of 0.83:1. Maximum patients 204 (40.8%) were in 41-60 years age group, followed by 164 (32.8%) in 21-40 years, 88 (17.6%) in 61-80 years, 42 (8.4%) below 20 years and 2 (0.4%) above 80 years of age (Table 1).

Vitamin D deficiency with levels below 10 ng/ml was noted in 130 patients (26%) out of which 50 (10%) were males and 80 (16%) were females. Vitamin D levels between 10-20 ng/ml were observed in 206 (41.2%) patients with 105 (21%) males and 101 (20.2%) females. Vitamin D insufficiency with levels between 20-30 ng/ml was seen in 83 (16.6%) patients with 37 (7.4%) males and 46 (9.2%) females. Sufficient Vitamin D between 30-50 ng/ml was seen in 47 (9.4%) patients with 25 (5%) males and 22 (4.4%) females. Vitamin D levels between 50-150 ng/ml was found in 33 (6.6%) patients with 14 (2.8%) males and 19 (3.8%) females. Toxicity of Vitamin D above 150 ng/ml was noted in one patient (Table 2).

Table 1: Demographic Data of Patients

Age	Male	Female	Total	%
0-20	26	16	42	8.4%
21-40	71	93	164	32.8%
41-60	88	116	204	40.8%
61-80	41	47	88	17.6%
>80	2	0	2	0.4%
Total	228 (45.6%)	272 (54.4%)	500	

Severe deficiency of vitamin D was seen in 21-60 years age group with 110 (22%) patients having levels below 10 ng/ml, followed by 13 (2.6%) patients in 61-80 years age group, 6 (1.2%) below 20 years and one patient above 80 years of age. Vitamin D levels between 10-20 ng/ml was in 78 (15.6%) in 41-60 years group, followed by 75(15%) in 21-40 years of age, 37 (7.4%) in 61-80 and 16 (3.2%) below 20 years of age.

Vitamin D levels between 20-30 ng/ml was seen in 34 (6.8%) of 41-60 years age, 22 (4.4%)

between 61-80 years, 17 (3.4%) in 21-40 years and 10 (2%) below 20 years of age. Sufficient Vitamin D between 50-150 ng/ml were observed in 35 (7%) patients of 41-60 years age group, followed by 18 in 21-40 years age,14 in 61-80 years age group (Table 2). Overall, deficiency of Vitamin D below 20 ng/ml was reported in 336 (67.2%) patients and insufficiency with Vitamin D levels <30 ng/ml was seen in 83 (16.6%) patients. 16% patients had sufficient Vitamin D levels in their blood and one patient was found to have vitamin D toxicity.

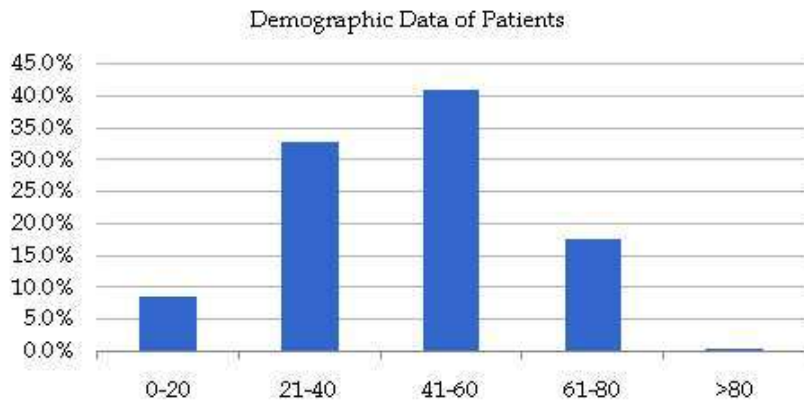


Fig. 1:

Table 2: Distribution of Vit D Levels in Different Age Groups

Age	<10		10-20		20-30		30-50		50-150		>150	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0-20	1	5	8	8	8	2	6	0	5	1	0	0
21-40	26	29	40	35	6	11	5	7	2	4	0	0
41-60	15	40	40	38	14	20	7	13	6	9	0	0
61-80	7	6	17	20	9	13	6	2	1	5	1	0
>80	1	0	0	0	0	0	1	0	0	0	0	0
Total	50 (10%)	80 (16%)	105 (21%)	101 (20.2%)	37 (7.4%)	46 (9.2%)	25 (5%)	22 (4.4%)	14 (2.8%)	19 (3.8%)	1 (0.2%)	0

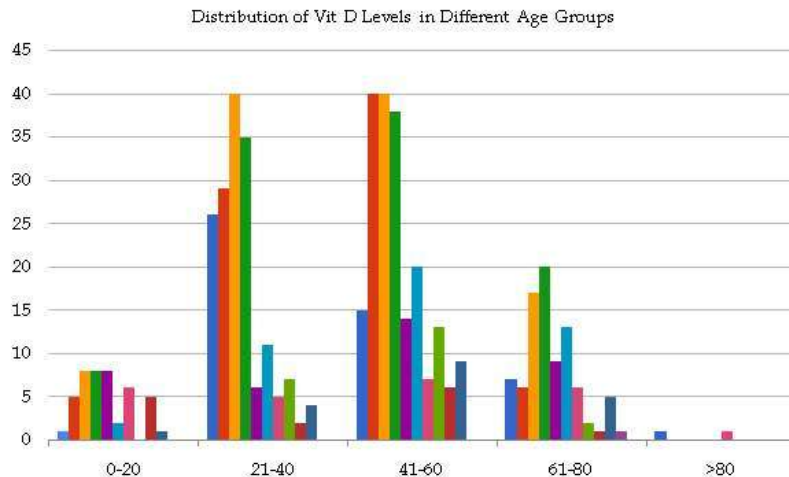


Fig. 2:

Discussion

Deficiency of Vitamin D is often unnoticed and therefore is a profound public health issue. Deficiency may be due to dietary insufficiency, inadequate exposure to sunlight, malabsorption syndromes, use of certain medications like phenytoin and phenobarbitone which accelerate the metabolism of Vitamin D and also due to end stage liver disease. Exposure to sunlight specially between 10AM to 3PM produces adequate Vitamin D by the skin which is enough to meet the daily Vitamin D requirements [16]. Increased skin pigmentation, aging and use of sunscreen lotions hampers the production of vitamin D through the skin. Salmon fish, Mackerel, blue fish as well as fortification of milk and dairy products are rich sources of Vitamin D3.

In our study, the prevalence rate of 67.2% was observed for deficiency of vitamin D in the urban population with maximum patients being middle aged and elderly females. We did not find Vitamin D deficiency in many paediatric patients.

In the United States, 60% of the nursing home residents and 57% hospitalised patients were found to have low levels of Vitamin D [17,18]. In a study of 316 people between 30-50 years in Middle East, the prevalence rate of deficiency of Vitamin D was 72.8% with females being more affected than males [19,20,21,22].

Studies from Lucknow by Sachan et al demonstrated a 84.3% to be deficient in Vitamin D in urban women [23]. Daga et al. in their study demonstrated 58.5% adults to be suffering from Vitamin D deficiency [24]. Pravina Shah et al. in their study found 94.94% subjects to be deficient in Vitamin D [25]. Agarwal et al. found a Vitamin D deficiency prevalence rate of 83.7% in their study population [26].

Deficiency of Vitamin D has been known to cause skeletal manifestations, depression, Parkinson's disease, increased suicidal tendency, infections, autoimmune diseases apart from cancers, heart diseases and obesity. India being a tropical country, boasts of having ample sunlight but surprisingly majority of the Indians suffer from Vitamin D deficiency. This may be due to the dark complexion of Indians, use of sunscreen lotions, scarves and aprons by young ladies when they move out in the day, travelling in air conditioned cars with little exposure to sunlight and working in air conditioned chambers throughout the day, specially in the urban population. A proper diet with fortified food and adequate sunlight exposure for about

20 minutes per day can prevent Vitamin deficiency. Educational programmes to raise awareness about the deficiency will bring about a favourable response. Affordable Vitamin D testing along with proper and timely initiation of treatment will also help in overcoming this major public health issue.

Conclusion

Deficiency of Vitamin D is quite prevalent in India and poses a profound public health issue specially in urban population. It remains a silent epidemic with only a few cases presenting with clinical symptoms which are only a tip of the iceberg. A public private partnership model with awareness programmes and affordable testing facility will help in detection of low levels of Vitamin D.

Conflict of Interest: None

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