

# Study of Vitamin D Deficiency in Urban Population of Kolhan, Jharkhand

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## Abstract

**Introduction:** Vitamin D deficiency is pandemic; yet, it is the most under diagnosed and under treated nutritional deficiency in the world. Vitamin D deficiency is wide spread in individuals irrespective of their age, gender, race, and geography.

**Aim:** The aim of the study was to study serum Vitamin D level among the urban population of Jharkhand and to determine the correlation between Vitamin D and selected variable of interest such as age, sex habitation with reference to diet, and social habits.

**Materials and Methods:** A cross-sectional study was conducted in the Department of Physiology, Mahatma Gandhi Memorial (MGM) Medical College, Jamshedpur (sample collected from the attended of Outpatient Department of MGM Medical College, Jamshedpur).

**Results:** The majority of the participant (84.61% had Vitamin D deficiency). In our results, the prevalence of Vitamin D deficiency increases with age and more common in female than male.

**Conclusion:** There is a high prevalence of Vitamin D deficiency in the population of Kolhan area of Jharkhand not only in female but also in male population.

**Key words:** Correction, Urban population, Vitamin D deficiency

## INTRODUCTION

Vitamin D deficiency is a major health problem across all age group in India and has assumed epidemic proportions despite India being a tropical country with adequate exposure of sunlight to an individual's "bare skin" required to photo synthesize Vitamin D is grossly ill understood. Darker skin has high melanin content which acts as a natural sunscreen. Therefore, darker skin produces a significance lesser amount of Vitamin D when compared with the individuals with fairer skin, such as

Caucasian.<sup>1-3</sup> Thus for Indian skin tone, minimum "direct sun exposure" required daily more than 45 min to bare face, arm and legs to sun rays (wavelength 290-310 nm). With the exception of those who perforce need to work outdoors in the sun, most of Indians do not get adequate sun exposure to produce sufficient amount of Vitamin D endogenously. Indian social and/or religious norms related to public modesty dictate that most parts of an individual's body irrespective of gender, be covered. Due to urbanization in big cities, a majority of people live in very high population density areas. They perforce to live in overcrowded tenements, which are closely packed and 3-4 stories high. Consequently direct sunlight not reach inside most parts of dwelling thereby disallowing any sun exposure to individuals. In addition, lack of space offers limited options for outdoor activities.

A women's lifestyle depends on several daily life activities, such as nutrition and dietary habits, sunscreen application Vitamin D intake and physical activity. A desirable lifestyle

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contribute to levels of Vitamin D within the normal range, while a lifestyle avoiding sunlight and low Vitamin D intake has adverse effect on their health.<sup>4,5</sup>

Vitamin D acts as a hormone. It stimulates intestinal calcium absorption and is important in maintaining adequate phosphate levels for bone mineralization, bone growth, and remodeling. It is also believed to be involved in the regulation of cell growth proliferation and apoptosis, as well as modulation of the immune system and other tensions. Alone or in combination with calcium Vitamin D has also been shown to reduce the risk of fracture in elderly men (>65 years) postmenopausal women and risk of falls in community dwelling seniors.

Definition of optimum levels of Vitamin D for maintenance of bone health has been a matter of debate. However, the evolving consensus is to define Vitamin D deficiency as a serum 25-hydroxyvitamin D level of <20 ng/ml (<50 nmol/L) insufficiency, 20-30 ng/ml (50-75 nmol/L) sufficiency >30 ng/ml (>75 nmol/L), and intoxication 150 ng/ml (>374 nmol/L).<sup>6</sup>

## MATERIALS AND METHODS

Total 182 people of age group 18-70 years were included in this study, who came as attendant along with patient in different Department of Mahatma Gandhi Memorial Medical College Jamshedpur. It was a cross-sectional study conducted during March 2016-2017. After taking consent, a questionnaire was filled which includes age, physical activity level, duration of sun exposure, body parts exposed to sunlight, use of sun screen, dietary intake of Vitamin D, and intake of supplements. After taking aseptic measure 2 ml of blood sample collected and sent to laboratory for Vitamin D3 assessment. Plasma levels were categorized into three cutoffs: When serum 25-hydroxyvitamin D (25(OH)D) levels were <20 ng/L - Vitamin D deficiency, when levels were 20-30 ng/ml - insufficiency and when levels, was >30 mg/ml - sufficiency.

Subject excluded from the study having any current or previous chronic diseases, history of Vitamin D deficiency, thyroid, parathyroid diseases, renal disease history of metabolic bone diseases, history of malabsorption syndrome, and chronic diarrhea.

## RESULTS

Out of 182 study subject, 110 (60.4%) were female and 72 (39.5%) male. Status of Vitamin D revealed in Tables 1 and 2 and Charts 1 and 2. Difference in the level

**Table 1: Serum (25(OH)D) levels female**

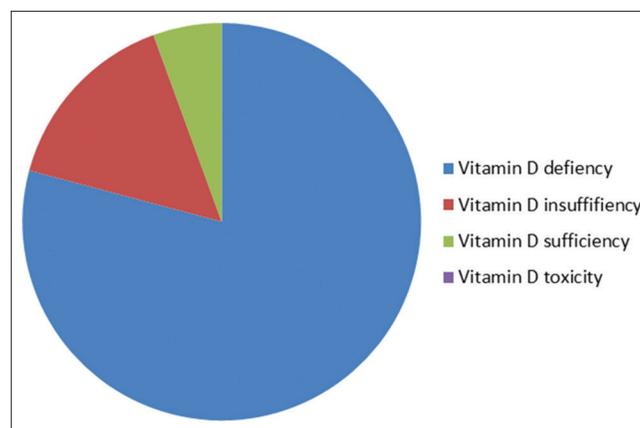
Serum 25(OH) levels	Cutoff level (ng/ml)	Number of patients (%)
Vitamin D deficiency	<20	97 (88.18)
Vitamin D insufficiency	20-30	10 (9.09)
Vitamin D sufficiency	>30	03 (2.72)
Vitamin D toxicity	150	0 (0)

25(OH)D: 25-hydroxyvitamin D

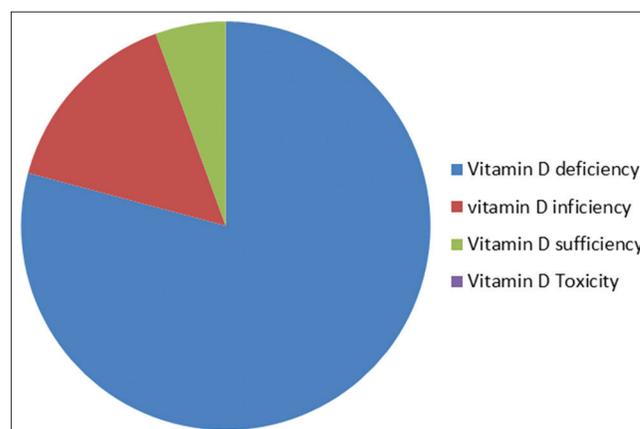
**Table 2: Serum (25(OH)D) levels male**

Serum 25(OH) levels	Cutoff level (ng/ml)	Number of Patient (%)
Vitamin D deficiency	<20	57 (79.17)
Vitamin D insufficiency	20-30	11 (15.28)
Vitamin sufficiency	730	4 (5.56)
Vitamin D toxicity	150	0 (0)

25(OH)D: 25-hydroxyvitamin D



**Chart 1: Prevalence of Vitamin D in female**



**Chart 2: Prevalence of Vitamin D male**

of Vitamin D between female and male in the urban area of Kolhan Jharkhand found to be statically significant. The study also showed relation between sunlight exposure and Vitamin D status of participant. Although it was not statistically significant Table 3.

**Table 3: Duration of sun exposure and serum 25(OH)D levels**

Duration of sun exposure time/day	Serum, 25(OH)D levels			Total
	Vitamin D deficiency <20 ng/ml	Insufficiency 20-30 ng/ml	Sufficiency 730 ng/ml	
Number of exposure				
No exposure	77	18	2	97
Up to 30 min	38	24	5	67
Up to 1 h	1	15	2	18
Total	116	57	9	182

25(OH)D: 25-hydroxyvitamin D

## DISCUSSION

The present study points toward a high prevalence of Vitamin D deficiency in an urban population of Kolhan, Jharkhand. A total of 182 subjects, 97 (88.18%) female and 57 (79.1%) male were found Vitamin D deficient. This is despite the fact that this region gets a good sunshine throughout the year and the people are well off and can afford good nourishment. Most of the study conducted on other Indian population show a similar picture of deficient Vitamin D status. Many authors suggested a revision of nutritional guide line and even a national level fortified food scheme to improve scenario.<sup>7</sup>

Female population had significantly higher prevalence of deficient Vitamin D levels compared to their male counterpart. However, this difference dissipates higher cut off levels, such that none of two groups fare better. Our study showed that only few women applied sun screen to protect their skin, this is not consistent with a study conducted in Australia by Wolpowitz *et al.* High percentage of these women apply sun screen to protect them from skin cancer.<sup>8</sup> Ultimately the recommendation for the avoidance of sun exposure has put the world population at risk of Vitamin D efficiency.

Prevalence of Vitamin D deficiency was significantly different across various age groups. Middle age group (41-60 years) displayed relatively lower prevalence compared to their younger (40 years and less) as well as older (61 years and more) counterpart. Elderly people are known to be prone to Vitamin D deficiency. Decrease exposure to sun light, reduced cutaneous synthesis of Vitamin D, and dietary inadequacy could be the factors contributing to lower Vitamin D level in the elderly.<sup>4</sup> Younger age group (40 years and less), our study circle, consisted mainly of employed person with long indoor working hours and less duration of exposure to sunlight. This group is also likely to eat irregularly and junk food, these factors could translate into lower Vitamin D levels.

The Food and Agriculture Organization /Worlds Health Organization expert consultation state that most physiological relevant and efficient way of acquiring

Vitamin D, in most location of the world around the equator (between latitude 42° N and 42° S) is to synthesize Vitamin D endogenously from skin from 7-de-hydro-cholesterol present in the subcutaneous fat by minimum of 30 min of skin exposure (without sunscreen) of the arm and face to mid-day sun.<sup>9</sup> Our study shows that out of 182 participants who has no exposure of sun light 42.30% deficient, 9.8% insufficient. Those who expose up to 30 min 20.8% deficient, 13.1% insufficient and those who exposed up to 1 h 0.5% deficient, and 8.2% insufficient.

Educational background of the subject does not seem to have effects of Vitamin D level. However, occupation affects Vitamin D level. None of those serving as public servant or pursuing various profession and business had the optimal level. Subject who reported to be a labor or house wife, or unemployed showed a significant optimal level. This probably suggests more staying duration and lesser sun light exposure to the service holder or professional.<sup>10-12</sup>

The institute of medicine recommended 200 IU/day of Vitamin D for the adults younger than 51 years, 400 IU/day 51-70 years, and 600 IU/day for those older than 70 years. Us Food and Drug Administration recommends 400 IU/day (10 µg/day) regardless of age.<sup>13,14</sup>

Few foods naturally contain Vitamin D like oily fish such as salmon (400 IU/35 Oz) and mackerel and cod liver oil (400 IU/TSF). Egg yolk also contains Vitamin D approximately 20 IU, but more commonly consumed food such as milk and butter egg give <100 IU. This study points toward inadequate dietary intake in the form of dairy product and vegetables in large group of population.<sup>14</sup>

## CONCLUSION

The current study found that Vitamin D deficiency and insufficiency were common among studied population. Deficiency was more in those who were exposed less to sunlight. Health education about sunlight and Vitamin D supplementation is necessary to prevent Vitamin D deficiency. Low calcium intake in consumption with Vitamin D deficiency makes matter worst. The need for

improvement in Vitamin D status is important and urgent in Jharkhand. The health planner needs to take substantive measures in this direction.

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