Original Article

To Assess and Compare Vitamin D Levels between Genders, Age Groups and Geographical Locations in A Secondary Care Hospital of Dimapur, Nagaland, India

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Abstract

Introduction: The deficiency of Vitamin D is a widely unacknowledged and disregarded health issue globally. The prevalence of this condition is observed across all age groups and genders, affecting various systems in the body.

Objectives: To assess the prevalence of hypovitaminosis D among the adult population and compare vitamin D levels between genders, age groups and geographical locations in patients visiting a **s**econdary care hospital at Dimapur.

Methods: A retrospective study was carried out over the period of one year from January 2022 to December 2022 on 665 patients (male: 33%, female: 64%) attending the outpatient and inpatient departments. Vitamin D levels were analyzed using enhanced chemiluminescence (vitros 5600).

Results: Out of 665 patients, 90 (14%) were found to be vitamin D deficient, 281 (42%) insufficient, 289 (43%) sufficient and 5 (1%) had toxic levels. Males showed a higher percentage (64%) in the vitamin D deficiency and insufficiency groups as compared with females (46%). In the age group of 42-53 years, a higher percentage of people (57%) were found to be affected with vitamin D deficiency and insufficiency. In the regional distribution of vitamin D status, it is observed that the people in the hilly regions have a higher percentage (61%) of vitamin D deficiency and insufficiency as compared with the valley regions (50%). However, there is no statistical difference in mean vitamin D levels within the deficient, insufficient and sufficient groups between genders, different age groups and geographical regions.

Conclusion: The present study carried out on patients from a secondary care hospital at Dimapur, Nagaland, shows that males have a higher percentage in vitamin D deficiency and insufficiency. In the age group of 42-53 years, a

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higher percentage of people were found to be affected with vitamin D deficiency and insufficiency. The vitamin D status of those living in the hilly region shows a higher percentage of vitamin D deficiency and insufficiency. However, there is no statistical difference in mean vitamin D levels within the deficient, insufficient and sufficient groups between genders, different age groups, and between hilly regions and valley regions.

Keywords: Deficient, Insufficient, Latitude, Prevalent, Sunlight, Vitamin D

Introduction

Vitamin D is a fat soluble hormone that plays an essential role in calcium homeostasis and mineralization of bones [1]. Vitamin D deficiency is currently considered a pandemic, and vitamin D insufficiency is the most commonly ignored and inadequately treated nutritional insufficiency on a global scale. According to the global estimations, more than 1 billion people are known to suffer from vitamin D deficiency, a matter of considerable importance in the 21st century[2,3]. In spite of experiencing ample sunlight, the deficiency is highly prevalent in India affecting all age groups and genders[4]. It is widespread in individuals irrespective of their age, gender, race and geography[5–7]. The peculiarity of vitamin D is that not only it can be ingested in the diet as cholecalciferol (vitamin D3) or ergocalciferol (vitamin D2), but can also be synthesized in the skin through adequate sunlight exposure [8]. Theoretically, it is not expected that regions with intense sunlight would suffer from a deficiency in vitamin D. However, there is substantial evidence suggesting a significant prevalence of vitamin D deficiency in countries with intense sunlight [9]. This can be attributed to various factors, such as geographical locations, types of clothing, skin colors, and diets lacking in sufficient vitamin D [10]. Regions located between 42°N and 42°S latitude receive abundant sunshine, which is responsible for the cutaneous production of vitamin D. In spite of experiencing ample sunlight, the deficiency is highly prevalent in India affecting all age groups and genders [11]. Nagaland, a northeastern state of India, lies in the latitude between 25°60 N and 27°40 N and previous studies have reported high prevalence of hypovitaminosis D in northern parts of India with a latitude of 27°N. Studies have proven an association between low circulating vitamin D level with increased risk of diabetes, common cancers, hypertension, autoimmune and infectious diseases [12–14].

Nagaland is a hilly state, but the uniqueness of Dimapur is its geographical location, near the border of Assam. Patients visiting the hospital at Dimapur are quite diverse, coming from both hilly and valley areas. At present, there is no data available on the vitamin D status of people living in Nagaland either across different age groups, genders or geographical locations. The objective of the present study was to assess and compare the vitamin D levels between age groups, genders and geographical locations among the patients visiting the secondary care hospital in Dimapur, Nagaland.

Material and Methods

A retrospective study of 665 patients attending the outpatients department and in-patients at a 200 bedded secondary health care hospital located in Dimapur, Nagaland. The data analysis was done on the vitamin D results over the period of one year from January 2022 to December 2022. Demographic information (age, gender, address) was retrieved from the hospital database.

Venous blood samples (2ml) were collected from the patients, and the serum was used for the estimation of 25(OH) D by enhanced chemiluminescence (Vitros5600). The procedures were followed as per the standard SOP.

The patients were classified as vitamin D deficient, insufficient, sufficient, or toxic based on the 25 (OH) D concentrations of <20 ng/ml, 20-29 ng/ml, 30-100 ng/ml or >100 ng/ml.

Inclusion criteria:

1. All Patients above 18 years and below 65 years for whom vitamin D levels was analyzed in our laboratory were included in the study.

Exclusion criteria:

1. Patients below 18 years and above 65 years
2. Patients with any complication of diabetes, thyroid disease, kidney disease, post renal transplant, skin, liver disorder.

Statistical analysis:

Data entry and analysis were done using Excel and SPSS 21 software. Continuous variables are expressed as mean ± SD and categorical variables as frequency and percentages. Student-t test was applied to compare the vitamin D levels between genders and geographical locations, whereas ANOVA was applied for comparing vitamin D levels between different age groups. P<0.05 is considered statistically significant.

Result

As observed in our study, out of the 665 patients who were evaluated for vitamin D status, 90 (14%) were found to be vitamin D deficient, 281 (42%) Vitamin D insufficient, 289 (43 %) Vitamin D sufficient and 5 (1%) had toxic levels of vitamin D as shown in Fig- 1.

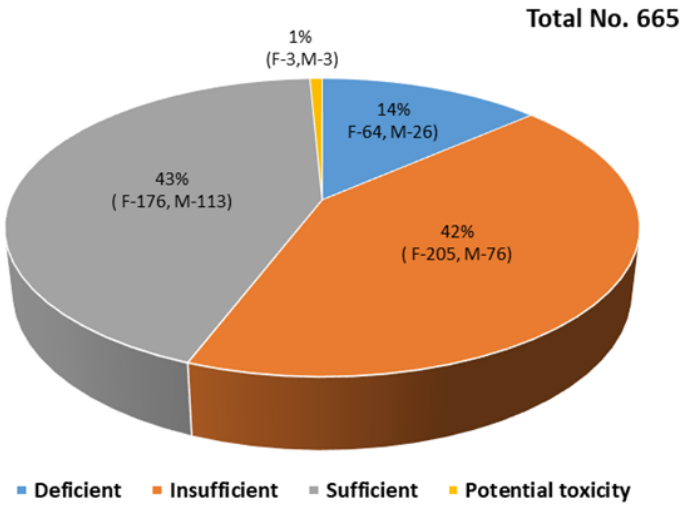

Figure 1: Classification of vitamin 25 (OH) D status in the study population

Out of 665 patients, 446 were females and 217 were males. As shown in Fig-2, there is no statistical significance in mean vitamin D levels within the deficient, insufficient and sufficient groups between males and females. However, it was observed that males had a higher percentage (64%) of vitamin D deficiency and insufficiency as compared with females (46%).

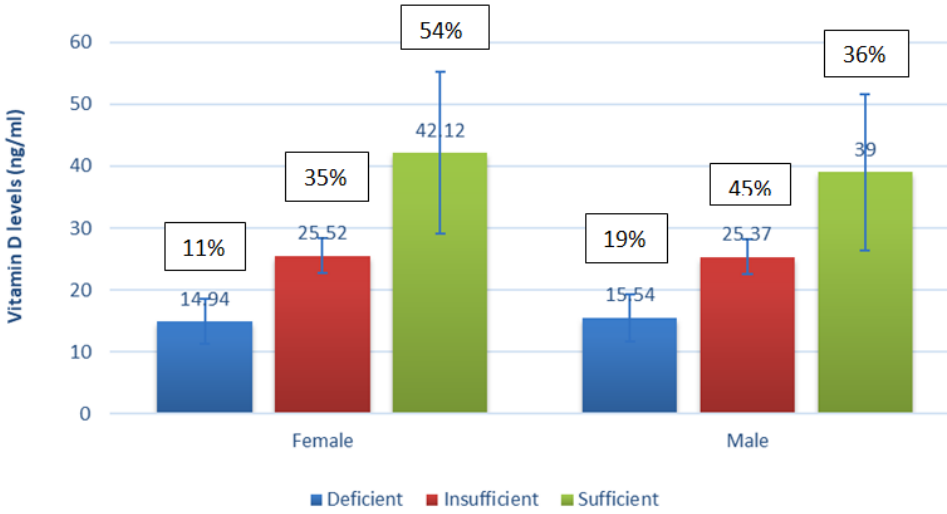

Figure 2: Gender-wise distribution of vitamin D levels

Among the male gender, 41 (19%) were vitamin D deficient (<20ng/ml), 99 (45%) were Vitamin D insufficient (20-29ng/ml), 77 (36%) with sufficient levels of vitamin D (30-100ng/ml), and only 2 were found to have vitamin D toxicity (>100ng/ml). Among females, 49 (11%) patients were deficient, 155 (35%) with insufficient levels of vitamin D, 239 (54%) had sufficient vitamin D levels, and 3 with vitamin D toxicity.

As shown in Fig-3, there was no statistical significance in the mean vitamin D levels of vitamin D deficient, insufficient and sufficient between different age groups. However, in the age group of 42-53 years, it is observed that a higher percentage of people (57%) were found to be affected with vitamin D deficiency and insufficiency.

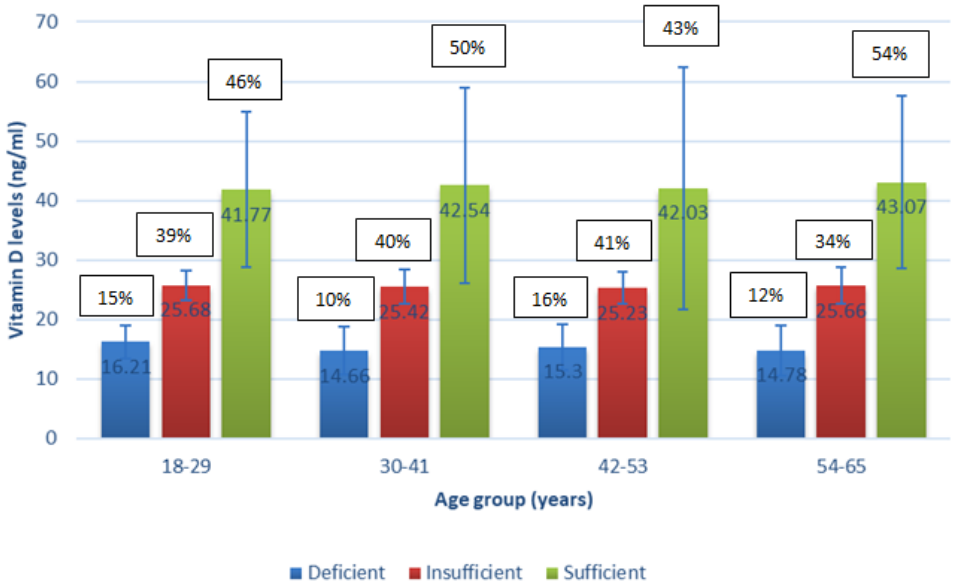

Figure 3: Age-wise distribution of vitamin D levels

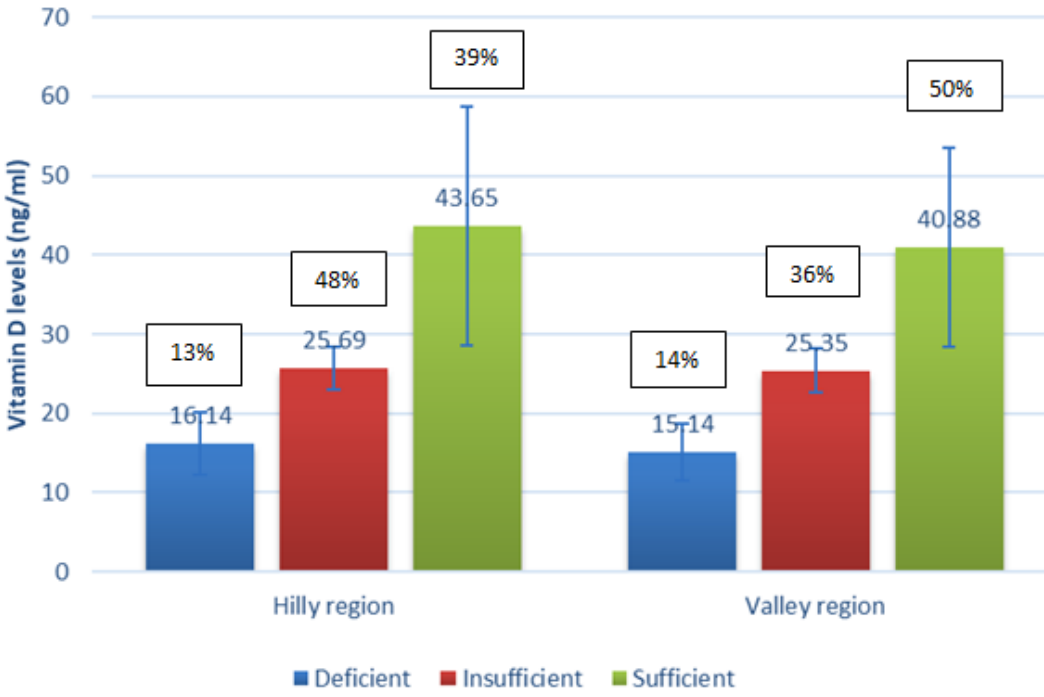

Figure 4: Comparison of Vitamin: D levels between hilly and valley population

As shown in Fig-4, the people in the hilly region have a higher percentage (61%) of vitamin D deficiency and insufficiency as compared with the valley region (50%). There was no significant difference in mean vitamin D levels of various subgroups such as vitamin D deficient, insufficient or sufficient between the hilly region and valley region.

Discussion

The global prevalence of vitamin D deficiency and insufficiency is increasing irrespective of age, gender, race and geography and India is in no exception. The intent of the present retrospective, cross-sectional study was to conduct a systematic evaluation of vitamin D status in the Nagaland population, in order to provide a comprehensive picture of the vitamin D status.

Most of us are neglecting the importance of vitamin D until we come across the deficiency symptoms. Hypovitaminosis not only causes osteoporosis but also a risk factor for diabetes, cancers of the breast, colon, prostate and ovaries. It was found that vitamin D supplementation reduces the risk of heart attacks, rheumatoid arthritis and multiple sclerosis [15]. A study carried out in the Kashmir valley of India reported a prevalence of 83% among adults, with higher rates among females as compared to males (94.4 versus 76.6%) [16]. Another study in Gujarat showed that about 88.6% subjects had vitamin D deficiency with 25(OH) D levels (< 30ng/ml). When vitamin-D status was cross tabulated with age, maximum deficiency was seen among 30-40y (31.9%) followed by 51-60y (29.8%) [17]. In a study at Thiruvananthapuram, 3320 subjects were analyzed for Vitamin D status. Surprisingly 64.5 % were deficient, 22.9% were insufficient and only 12.6% had sufficient Vitamin D level. These findings are in agreement with that reported by Sandhiya Selvarajan et al [18]. Similarly, another study reported vitamin D deficiency in women of reproductive age group (76 %) and in post-menopausal women (70%)[19]. One of the major reasons for the widespread of vitamin D deficiency is the lack of awareness about the importance of Vitamin D in health benefits and prevention of a deficient state. Awareness and education campaigns about Vitamin D at the community level together with normal and high-risk populations could help to prevent at least long-term complications.

In our study, we found that out of a total of 665 (M- 219, F- 446), 371 (56%) were found to be Vitamin D deficient and insufficient, 289 (43%) were found to be sufficient and 5 (1%) were found to have toxic levels. Males had a higher percentage (64%) of vitamin D deficiency and insufficiency as compared with females (46%). In the age group of 42-53 years, it is observed that a higher percentage of people (57%) were found to be affected with vitamin D deficiency and insufficiency. The people in the hilly region have a higher percentage (61%) of vitamin D deficient and insufficient group as compared with the valley region.

More awareness is needed for the increasing level of Vitamin D inadequacy in all age groups across the country. The extremely high prevalence of Vitamin D deficiency points to the need for supplementation of vitamin D. The present situation demands framing proper training modules that could help in the identification, prevention, and treatment of Vitamin D deficiency and increased awareness at an early stage which could install adoption of health-related behavior at a personal level.

To the best of our knowledge, this is the first of its kind study evaluating vitamin D status in the general Nagaland population. This retrospective analysis has made an effort to present insight into vitamin D status not only on people residing northeast India, but also on the basis of sex, age group, and regions. However, we have used data from a central lab, which originated from the uniform analytic method platform and data was analyzed using standard definitions of conditions and outcomes. Moreover, we feel the results of this retrospective analysis will be useful for providing preliminary data and guiding the development of future prospective studies.

Conclusion

Greater awareness about the multiple consequences of vitamin D deficiency and insufficiency is required among patients to enable them to foresee the burden of this silent epidemic. The majority of the participants were from Dimapur City, but more detailed information about skin type or color is required to evaluate the likely causes of vitamin D deficiency and insufficiency in such regions.

Ethical approval: IEC authorization gained via IEC authorization (No. CIHSR-IEC/2023-24/ExpRev/209, dated 8/07/2023)

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Conflict of Interest: Nil

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