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Original Article

STATUS OF VITAMIN D DEFICIENCY AMONG THE PATIENTS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background:
It has been observed that one billion people in the world have vitamin D deficiency as a public health problem. This study aims to find out the status of vitamin D in the gender of male, females, and different age groups <15 to >62 years of age.

Methods:
This was a retrospective study carried out at B&C Medical College Teaching Hospital and Research Centre, Jhapa from 1st January to December 31st, 2021. Vitamin D_3 levels were tested with Chemiluminescence Immuno Assay (CLIA) technique. The status of vitamin D was defined as deficient if vitamin D_3 level was less than 20ng/ml. We focused to find out the pattern of increased or decreased serum vitamin D level as its deficiency and surplus have an adverse effect on our health. Ethical approval was obtained from the Institutional Review Committee of B&C Medical College Teaching hospital and research Centre (Ref-0012022)

Results:
A total of 7,402 healthy individuals (<15->62 years of age) females 4914 (66.4%) and males 2288 (33.6%). Vitamin D deficiency was observed high in females than males. It was also observed that in the age group 15-30 years vitamin D deficiency was 52.8% which was highest among the age group and sufficiency only 18.4% were in this group.

Conclusion:
This study shows vitamin D deficiency was higher in females than males. If the deficiency can be deducted early, prompt management can be carried out and thus complications can be prevented.

Keywords: Vitamin D status, Vitamin D deficiency, Prevalence.

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INTRODUCTION

Vitamin D deficiency is an important public health problem in both developing and undeveloped countries and is considered to be the most common nutritional deficiency and one the most common undiagnosed medical conditions in the world[1]. Vitamin D is a fat-soluble, sunshine hormone needed during infancy, adolescence, adulthood, and pregnancy as it is required for normal calcium absorption from the gut and bone growth[2-3]. Sunlight is the best source of Vitamin D and its presence in food is limited[4]. Cutaneous synthesis of vitamin D is obtained by the conversion of 7-dehydrocholesterol to cholecalciferol by ultraviolet sunlight[5].

Majority of the people in the world, approximately 90% of vitamin D is synthesized in this way and the remaining 10% may obtain exogenous from nutrients or supplements[6- 7]Nutritionally, vitamin D (25-OHD) rich foods are fatty fish, eggs, cod liver oil, and 25-hydroxyvitamin D fortified supplements[8]. Vitamin D (25-OHD) has an endocrine role in the absorption of calcium by the intestine and is to be taken up to the blood stream[9]. Generally two forms of vitamin D (25-OHD) exist which refer to vitamin D_2 (ergocalciferol) and vitamin D_3 (cholecalciferol)[10] Occurrence of vitamin D (25-OHD) deficiency is high and is now documented as a worldwide health problem. An estimated calculation shows that about 1 billion people worldwide are deficient or have insufficiency[11]. One of the most contributing factors is thought to be due to developmental changes has shifted our lifestyle to urbanization[12] and insufficient diet supplementation[13].In blood, the concentration of vitamin D (25-OHD) is commonly used as a biomarker for vitamin D profile with a half-life of approximately a few weeks[14-15]. Making it an ideal marker to measure whether a patient is vitamin D deficient, sufficient, or intoxicated, a normal level of vitamin D (25-OHD) is essential to maintain bone metabolism. The chronic deficiency of vitamin D leads to diminution of bones reservoirs of phosphate, calcium, and inadequate bone matrix mineralization, which is a risk factor for rickets in children and osteomalacia in adults[16-17]. Subsequent investigations proved its role in the protection of the older from osteoporosis[18]. Vitamin D (25-OHD) has an endocrine role in the absorption of calcium by the intestine and is to be taken up to the bloodstream[9]. Vitamin D (25-OHD) exists in two forms which refer to vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol)[10].

The importance of vitamin D in body metabolism and many immune functions has been well established and proven through literatures[19]. Previous studies demonstrate the relation between vitamin D deficiency and various medical disorders like depression, diabetes type 1, syndrome, as well as chronic widespread muscle and bone pain[20-24]. And even in infancy, it causes rickets and hypocalcemia fits[25-26]. There are several factors has been linked to vitamin D deficiency in infancy like a low diet of vitamin D and decreased sunlight exposure due to fear of cancer, pigmentation, or weather variation[27]. This significance decreased in vitamin D levels worldwide in different age groups shows a lack of awareness about vitamin D importance and its resources.

METHODS

This was a hospital-based retrospective study conducted among OPD and IPD patients visiting B&C Medical College Teaching Hospital & Research Centre, (B&CMCTHRC) Jhapa, Nepal from January 1st to 31st December 2021. Data has been collected from the Biochemistry central laboratory computer software. All the collected data were compiled and entered in MS-excel. Statistical package for social science (SPSS 16.0) was used for data analysis. Data were presented as mean± SD. Statistical significance was calculated using the Chi-square test and p-value < 0.05 was considered significant. The ethical approval was obtained from the Institutional Review Committee of B & C Medical College Teaching Hospital & Research Centre (Ref: 0012022). Study population of this study all the OPD and IPD patients of age group <15 to >62 years were included. Patients except for chronic disease and known case of vitamin D, taking the supplement were excluded. After excluding the sample with serum vitamin D levels beyond greater/less than the detection limits of the instrument for each participant during a particular single visit, the total sample size was 7,402 and further subgroup analysis was done based on age and gender. Age groups were categorized as <15 years, 15-30, 31-46, 47-62, and >62years respectively.

The level of vitamin D (25- OHD) was measured by Chemiluminescent immunoassay (CLIA) methods. Vitamin D deficiency was defined as less than 20ng/ml, insufficiency as 20-30ng/ml, and sufficiency as >30ng/ml. Vitamin less than 10ng/ml was regarded as a severe deficiency[28].

All relevant information for each study subject was recorded in SUKRA software on the computer. Data was collected by the Co-author. All the collected data were compiled and entered in MS-Excel and analyzed using Statistical Package for social science (SPSS-16.0) Data were presented as mean± SD. Statically significance was calculated using the Chi-square test and p value <0.05 was considered significant.

RESULTS

In our study population table 1&fig 1&2 total subjects were 7,402 of which male was 2,488 (33.6%), and female was 4914 (66.4%) Mean, Std. deviation (SD) value of male was 29.06±16.51 while the female was 24.29±14.82. Age range from <15 years to >62 years

in the different age groups and statistically significant with p- the value of 0.00. In the age group, 47-62 years is the highest 38.09% and 31-46 years and the second-highest 29.18% were suffering more vitamin D deficiency. Mean and Std. The deviation value of this age group were 26.41±15.63, 24.36±14.32 respectively.

In table 2 & fig 3 shows according to gender i.e male and female. It was also categorized as sufficient, insufficient, and deficient in different gender i.e., male and female. In the case of male deficient were 32.4% and 30.5% insufficient while in the case of females 48.4% were deficient and 28.4% were insufficient. Sufficient cases in males and females were 36.9% and 23.1% respectively. Statuses of vitamin D females are more deficient 48.4% compare to male 32.4% deficient.

In table 3, 4 & fig 4&5 shows 43.1% deficient while 29.2% insufficient and only 27.8% were sufficient of the total study population. Vitamin D deficiency in the age ranges from the different group were <15 years,15-30, 31-46, 47-62 and >62 years in which deficient were 41.2%, 52.8%, 47.5%, 40.6% and 36.4% while insufficient were 33.8%, 28.8%, 28.1%, 31.2%, 27.8% and sufficient were 25.0%, 18.4%, 24.4%, 28.2% and 35.8% respectively. In our study it was observed that in male and female was a more difference regarding vitamin D level as shown in table 1&2.

Table 1: Vitamin D status according to Gender and different age group N= (7402)

Gender	Frequency (f)	Percentage (%)	Mean ± SD
Male	2488	33.6	29.06±16.51
Female	4914	66.4	24.29±14.82
Age group (Years)			
<15	140	1.99	25.04±13.78
15-30	914	12.34	22.48±13.63
31-46	2160	29.18	24.36±14.32
47-62	2302	31.09	26.41±15.63
>62	70	25.37	28.77±17.28
Total	7402	100	25.90±15.57

Fig 1:

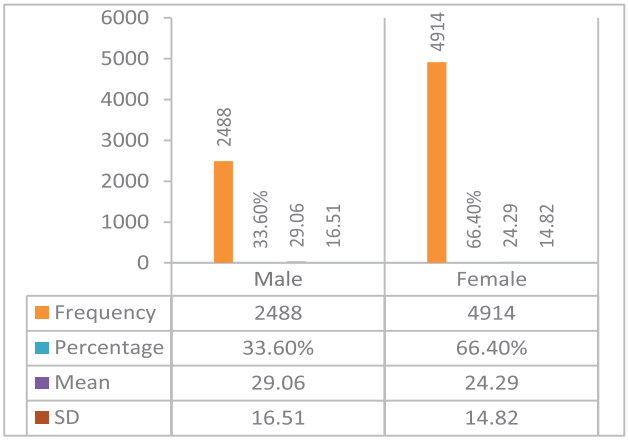


Table 2: Vitamin 'D' deficiency In Gender (N= 7402)

Gender	Deficient	Insufficient	Sufficient	Total
Male	808 (32.4)	761 (30.5)	919 (36.9)	2488 (33.6)
Female	2379 (48.4)	1399 (28.4)	1136 (23.1)	4914 (66.40)
Total	3187 (43.1)	2160 (29.2)	2055 (27.8)	7402 (100)

Fig 2:

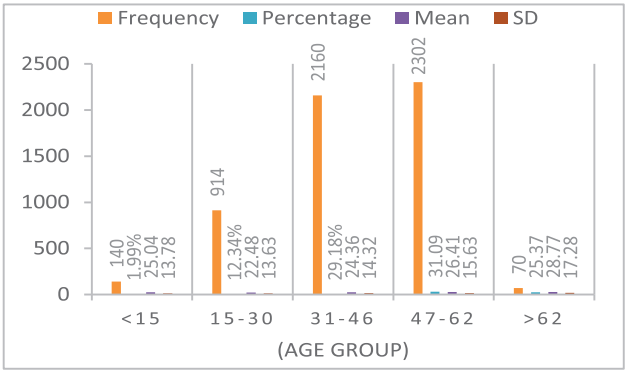


Table 3: Status of vitamin D among the patients (N= 7402)

Status of Vitamin 'D'	Frequency (f)	Mean ± SD
Deficient	3187 (43.1)	14.14±3.99
Insufficient	2160 (29.2)	24.49±2.76
Sufficient	2055 (27.8)	45.60±15.57
Total	7402(100.0)	2590±15.57

Fig 3:

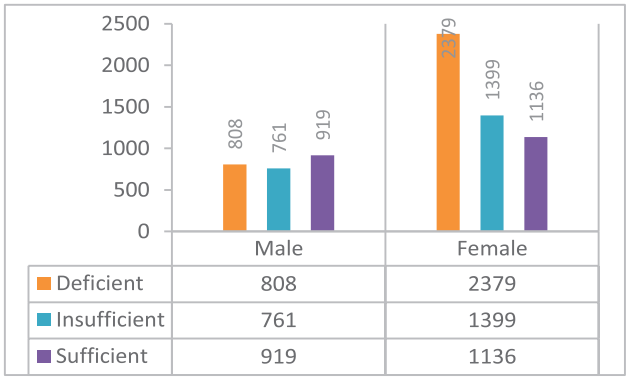


Fig 4:

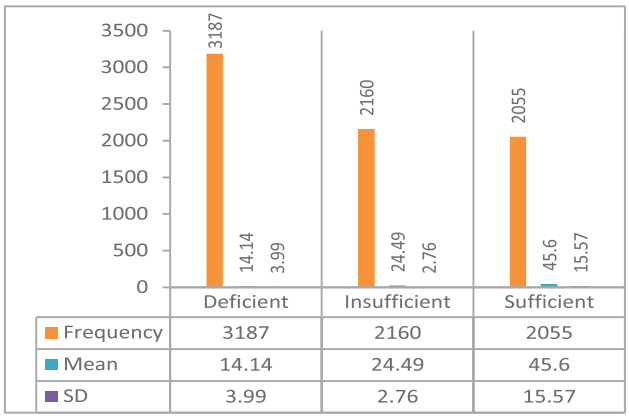
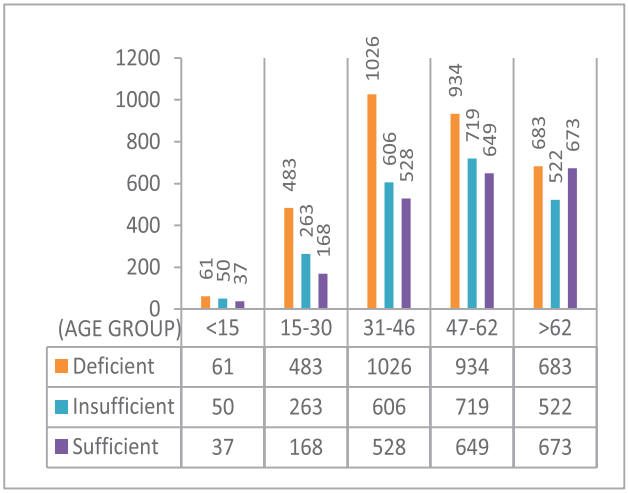


Table 4: Status of vitamin D among the patients in age groups (N= 7402)

Age groups (Years)	Deficient	Insufficient	Sufficient
<15	61 (41.2)	50 (33.8)	37 (25.0)
15-30	483 (52.8)	263 (28.8)	168 (18.4)
31-46	1026 (47.5)	606 (28.1)	528 (24.4)
47-62	934 (40.6)	719 (31.2)	649 (28.2)
>62	683 (36.4)	522 (27.8)	673 (35.8)
Total	3187 (43.1)	2160 (29.2)	2055 (27.8)

Fig 5:



DISCUSSION

In this study, we observed a high prevalence (66.4%) of vitamin D deficiency in females, the result is all most similar to Regmi et al 74.2% and Shrestha et al 78.2% reported[29-30]. Other few studies that have investigated vitamin D status in a different group of the population of Nepal were 73.68% in Kathmandu valley and 59.8% in lactating mothers of Bhaktpur[31]. Other Asian countries i.e. India (84-100%), Saudi Arabia (98.1%), Korea (59.1%), Malaysia (35.3%) also have a prevalence of vitamin D deficiency[31-33] the Asian diet with its paucity of foods containing vitamin D and high phytate content may be the cause of the rise in vitamin D deficiency in this region. Among total deficient patients of our study, we found 43.1% cases in a deficient category.

Globally the deficiency of vitamin D is one of the public health issues and females are more sufferers than males. In our study low level of vitamin D level, 66.4% were female which is a serious issue and correspondence with finding conducted in Libya[28]. Another study vitamin D deficiency in female[34]they found 73%. Several factors have been postulated for the relatively low level of vitamin D in females including prolonged indoor stay, sunscreen use, lack of sun exposure, pregnancy, and lactation[35].

It was a hospital-based study in which we included the age group <15 years to >62 years. In this study, results showed that the majority of the patients of female are more than male of vitamin D deficiency. It also shows in table 4 the age group 15-30 years highest deficiency of vitamin D 52.8% while second highest were 47.5% in the age group of 31-46 years.

Vitamin D (25-OHD) deficiency is an innovative worldwide emerging problem among all age groups[36-38]. Vitamin D is used as a biomarker for bone metabolism. When the level of vitamin D (25-OHD) decreases <10ng/ml, the physicians prescribe for taking sufficient doses constituting 50,000 IU of vitamin D weekly up to 2-3 months[39]. Vitamin D (25-OHD) enhanced profiles are necessary for muscle strength.

CONCLUSION

Based on our study revealed that females are more likely to have deficient vitamin D levels due to their lifestyle, insufficient diet, and less exposure to sunlight. We recommended that need to survey epidemiological in the overall population of vitamin D level and the factors associated with these conditions.

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Conflict of interest: None

Ethical approval: Yes

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