

Pattern of Serum Vitamin D in Hospitalised Patients: A Retrospective Study

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Abstract

Background: To find out the prevalence of vitamin D deficiency in patients hospitalised in two tertiary care centres for various ailments in Eastern Bihar and North Bengal. **Methods:** Hospitalised patients in MGM Medical College, Kishanganj, Bihar and Medical North Bengal Clinic, Siliguri, West Bengal (Jan 2014 to Dec 2014) who underwent blood sampling for vitamin D estimation in their work up for various ailments were included in the study. **Result:** Out of 108 patients, 65 were female and 43 were male in the age group ranging from 1 month to 85 years. Maximum number of patients was in the age group of 41 to 60 years. Seventy two percent patients had low vitamin D levels with 54.63% having frank deficiency and 17.59% had insufficient levels. Diabetes mellitus and/or hypertension were the most common diseases associated with hypovitaminosis D followed by diseases of respiratory system. **Conclusion:** Vitamin D deficiency was seen in 72 % of the subjects with female preponderance. No age was spared as the age of the subjects ranged from 1 month to 85 years with majority in the 41 to 60 years age group. Among subjects with hypovitaminosis D, diabetes mellitus and /or hypertension were the most commonly encountered diseases.

Key words: Vitamin D, Hypovitaminosis D, Diabetes, Hypertension

Introduction

Vitamin D deficiency is one of the most widespread nutritional deficiencies in the world and in the Indian subcontinent despite of plenty of sunshine it prevails in epidemic proportions. 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 [1]. Various research papers have attributed many reasons for the epidemic. Some of the important factors which contribute to the above scenario in India include socioreligious and cultural restrictions towards adequate sun exposure [2], vegetarianism [2], increased office hours in urban India

[2], unplanned unspaced pregnancies [3], burqa system in Muslims [3] etc. Vitamin D whose active form is 1, 25 dihydroxy cholecalciferol is a steroid hormone. It works through specialised receptors called VDRs (vitamin D receptors) [4]. VDRs are present in almost every tissue of the body including bones, intestines, kidneys, liver, heart brain, skin, osteoblasts, activated T and B lymphocytes, gonads, prostate, breast and mononuclear cells. Hence its deficiency can involve almost any tissue in the disease process [5].

Widespread prevalence of vitamin D deficiency in India is a well known fact. This study was carried out to know the level of vitamin D in the population of this region, which has very limited data so far in this regard.

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Material and Methods

Present study is a multicentric retrospective study done in MGM Medical College, Kishanganj, Bihar and Medica North Bengal Clinic, Siliguri, West Bengal. One hundred and eight subjects were included in the study, out of which 43 patients were male and 65 were female. All indoor patients who were admitted either in MGM Medical College Kishanganj, Bihar or in Medica North Bengal Clinic, Siliguri, West Bengal and who underwent blood sampling for vitamin D estimation in their work up for various ailments from January 2014 to December 2014, were included in the study. The purpose of the study was to find out the status of vitamin D3 in these patients who were admitted in the hospital for various diseases. Those patients who were

taking vitamin D3 or steroids in any form were excluded. Socio economic status was not a bar and patients from all socio economic status were included. The data of vitamin D assay of the above patients in the 1 year period were extracted from the hospital information system and medical record department (MRD). Only those patients whose vitamin D3 levels were estimated from the laboratories of the respective hospitals or from reputed laboratories were included in the study. The cut off levels used in our study for defining sufficiency / deficiency was based on recommendation by Michael F Holick et al [6-10], which was as follows (a) Vitamin D deficiency: Level <20 ng/ml (b) Insufficiency: Level between 21 – 29 ng/ml and (c) sufficient: level of 30ng/ml and more.

Results

Hundred and eight patients were included in our study out of which 43 patients were male and 65 were female. The age group of our patients ranged from one month to 85 years.

Table 1: Age and Sex Distribution of the study population.

Age group	Male (number)	Female (number)	Total (number)
<1 year	4	9	13
1 – 20 years	8	10	18
21 – 40 years	6	10	16
41 – 60 years	9	23	32
61 – 80 years	12	14	26
>80 years	2	1	3

Maximum number of patients was in the age group of 41 – 60 years followed by 61 – 80 years (Table 1)

Table 2: Serum Vitamin D level in the study population (n=108).

Vitamin D level	Male (percent)	Female (percent)	Total (percent)
<20 ng/ml	21(19.44%)	38 (35.19%)	59 (54.63%)
21 – 29 ng/ml	8 (7.41%)	11(10%)	19 (17.59%)
>=30 ng/ml	15(13.89%)	15(13.89%)	30 (27.78%)

As depicted in table number 2 above, out of the 108 patients vitamin D deficiency (<20 ng/ml) was seen in 59 patients whereas 19 had insufficient vitamin D levels (21 – 29 ng/ml) and 30 patients had normal vitamin D levels (30 ng/ml and more). In our study 72 % patients had low vitamin D levels with 54.63 % having frank deficiency and 17.59 % had insufficient levels. Sufficient level of vitamin D was found in 27.78 %.

Mean value of vitamin D in our subjects was 23.17ng/ml. Out of the 59 patients with vitamin D below 20 ng /ml, 21 patients were male and 38 were female. Eight male patients and 11 female patients were found to have vitamin D levels between 21-29 ng/ml. And 15 male and 15 female patients had normal vitamin D levels.

Histogram showing pattern of Vitamin D level in the study population (n=108).

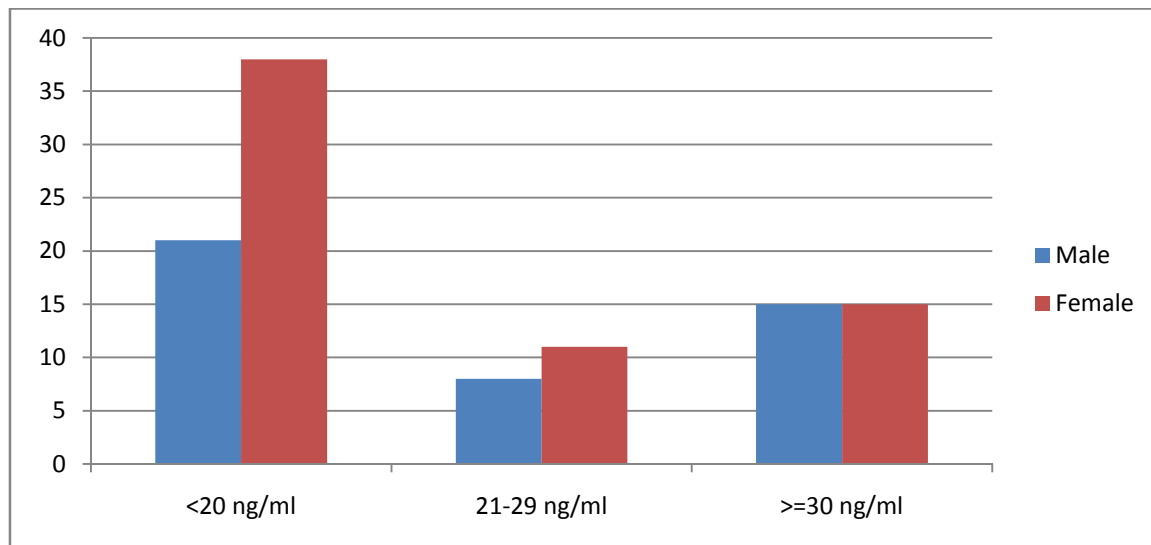


Table3: Disease pattern in Vitamin D deficient subjects, insufficiency & sufficient Vitamin D levels patients.

Diseases	Vitamin D deficient	Vitamin D insufficiency	Sufficient Vitamin D levels
Diabetes	8	1	1
Diabetes with Hypertension	8	4	5
Hypertension	7	4	7
Acute Respiratory Tract Infection	9	3	6
Acute gastrointestinal tract infection	3	0	0
Acute muscle pain	0	1	0
Anaemia	0	2	6
Spondylosis	8	2	1
Irritable Bowel Syndrome	0	0	1
Acid Peptic Disorder	2	0	2
Allergic Rhinitis	2	1	0
Carcinoma lung	0	1	0
Fibroid uterus	1	0	0
Cholelithiasis	2	0	0
Fracture neck of femur	0	0	1
Acute Coronary Syndrome	1	0	0
COPD	1	0	0
Bronchial Asthma	3	0	0
Bronchiolitis	4	0	0

- Twenty three patients (21.29%) out of 108 who were vitamin D deficient (level below 20 ng/ml) had diabetes mellitus and/or hypertension. Nineteen patients (17.59%) had diseases related to respiratory system (Acute Respiratory Tract Infection, Allergic Rhinitis, Bronchiolitis, COPD and Bronchial Asthma) and eight patients (7.41%) had spondylosis (Cervical / Lumbar).
- In the group having insufficient levels of vitamin D (level between 21 to 29 ng/ml) 9 patients (8.33%) had diabetes mellitus and /or hypertension, three (2.77%) had respiratory tract infection. Carcinoma lung was seen in one patient.
- In patients having sufficient levels of vitamin D (30 ng/ml and more), eight patients (7.41%) had diabetes mellitus and /or hypertension whereas anemia was seen in 6 (5.55%) patients.

In the three different categories of serum vitamin D levels measured in the study population (deficient, insufficient and adequate), the patients with diabetes mellitus and diabetes mellitus with hypertension were distributed as per the table depicted below. (Table 4)

Table 4: Vitamin D levels in diabetic subjects.

Disease	Vitamin D deficiency	Vitamin D insufficiency	Adequate Vitamin D
Diabetes	8	1	1
Diabetes and Hypertension	8	4	5
Total	16	5	6

Discussion

Vitamin D deficiency is wide spread in individuals irrespective of their age, gender, race and geography as is evident from the innumerable number of publications worldwide in this regard. Vitamin D functions in the body through both an endocrine mechanism (regulation of calcium absorption) and an autocrine mechanism (facilitation of gene expression).

The former acts through circulating calcitriol, whereas the latter, which accounts for more than 80% of the metabolic utilization of the vitamin each day, produces, uses, and degrades calcitriol exclusively intracellularly. In addition to diseases like rickets and osteoporosis the consequences of low 25(OH) D status include increased risk of various chronic diseases ranging from hypertension to diabetes to cancer [11].

There is a large body of epidemiologic data showing an inverse association between incident cancer risk and antecedently measured serum 25(OH) D [12-15]. This evidence has been accumulated for such cancers as prostate, colon, breast, lung and marrow/lymphoma, among others. Although cancer is not an uncommon entity in this part of the country, in our study only one subject had cancer. The reason could be the small sample size.

In the days when rickets was rampant, children with this disorder frequently died of respiratory infections. Calcitriol in its autocrine role has been recognized for roughly 20 years as playing a role in various aspects of the immune response [16,17]. In our study too, 16 patients (14.81%) had Acute Respiratory Tract Infection along with low vitamin D levels (<30 ng/ml).

Both type 1 and type 2 diabetes have been associated with low vitamin D status, both current and antecedent [18-20]. The association of vitamin D status and hypertension is particularly strong. Both control trials and meta-analyses have shown a protective effect of high calcium intake for both pregnancy-related and

essential hypertension [21-25]. In our study too, out of total 108 subjects, 32 patients (30%) had diabetes mellitus and /or hypertension in association with hypovitaminosis D (<30 ng/ml). The other major group having hypovitaminosis was that with spondylosis (9%).

Conclusions

To conclude, vitamin D deficiency was seen in 72% of our patients with a mean value of 23.17ng/ml. This problem does not spare any age group and is found in a wide spectrum of illnesses. This further reiterates the fact that hypovitaminosis D is a common problem in India and our region is no exception. The need of the hour is to spread awareness about the problem and evolve strategies to provide affordable vitamin D supplements and also fortify the food. The medical fraternity at large and the government can certainly bring this change, if the effort is sincere and in right earnest.

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