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Research Article

Vitamin D status in outpatient department patients: a retrospective study

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ABSTRACT

Background: Although there are innumerable studies on vitamin D deficiency in India, there is limited data in Eastern Bihar and North Bengal. Keeping this in view, the aim of our study is to find out the prevalence of vitamin D deficiency in our region.
Methods: Patients attending the outpatient departments (OPDs) in MGM Medical College, Kishanganj, Bihar, India and Medica North Bengal Clinic, Siliguri, West Bengal (January 2014 to December 2015) for various ailments and who were advised vitamin D estimation were included in our study.
Results: Out of 485 patients, 187 were male and 298 were female. Age of the study population ranged from 1 month to 83 years. Maximum number of patients was in the age group of 21 to 60 years. Vitamin D deficiency was seen in 74.44 % out of which 54.22% had frank deficiency and 20.22% had insufficient levels with 46.4% female and 28.04% male subject.
Conclusions: Prevalence of vitamin D deficiency is very high in our region that is in Eastern Bihar and North Bengal, as is reflected from our study. This is the pattern seen in other parts of our country too. Also, the deficiency is high in the age group 21 to 60 years and females outnumber the male.

Key words: Vitamin D, Hypovitaminosis D

INTRODUCTION

It has been estimated that one billion people worldwide have vitamin D deficiency or insufficiency.[1] In India majority of its population lives in areas receiving ample sunlight throughout the year hence there was disbelief that vitamin D deficiency is uncommon.[2] However, from the data available in the published literature, vitamin D deficiency is very common in India in all the age groups and in both sexes, across the country with a prevalence of 50 to 90 percent. [3-5]

The major source of vitamin D for humans is exposure to sunlight.[1-6]Anything that diminishes the transmission of solar UVB radiation to the earth's surface or any factor that alters the penetration of UVB radiation into the skin will affect the cutaneous synthesis of vitamin D.[3,7]

Vitamin D is metabolised in the liver to 25(OH) D and then in the kidneys to its active form 1, $25(OH)_2$ D.[8-9] It is also recognised that many other tissues in the body, including macrophages, brain, colon, prostate, breast and other, have the enzymatic machinery to locally produce $1,25(OH)_2$ D.[10-14]

Hypovitaminosis D leads to increased risk of many diseases ranging from rickets, osteoporosis to many chronic diseases like diabetes, hypertension and cancer .[15]

Given the limited available data on the vitamin D status among the population of Eastern Bihar and North Bengal, our endeavour was to find out the prevalence of vitamin D deficiency in our region.

METHODS

This is a retrospective study conducted at Mata Gujri Memorial Medical College and Lions Seva Kendra, Kishanganj, Bihar and Medica North Bengal Clinic, Siliguri, West Bengal.

Both are tertiary care centres in Eastern Bihar and North Bengal respectively. All patients who underwent blood sampling for vitamin D estimation during their visit to outpatient department from January 2014 to December 2015 in the above centres were included in our study. The data of vitamin D assay of 485 patients in the 2 year period were extracted from the hospital information system and medical record department (MRD) and were reviewed extensively. In addition to our attempt to find out the prevalence of vitamin D deficiency in our region, the study population was further categorised on the basis of age and sex. The age group ranged from 1 month to 83 years which included 187 male and 298 female subjects.

The cut off levels used in our study for defining sufficiency / deficiency was based on recommendation by Holick MF et al 1,16-19, which is as follows(a) Vitamin D deficiency: Level <20 ng/ml (b) Insufficiency: Level between 21–29ng/ml and (c) sufficient: level of 30ng/ml and more.

RESULTS

A total of 485 patients who underwent vitamin D estimation were included in our study with 187 male subjects and 298 female subjects.

The age group of our subjects ranged from 1 month to 83 years. We had 14 subjects in age group less than 1 year with equal sex distribution. In the age group 1-20 years there were 46 male and 30 female subjects.

Maximum numbers of subjects were seen in the age group 21-40 and 41–60 years with 163 and 160 subjects respectively. There were 54 male and 109 female in the former and 49 male and 111 female in the latter group. In the age group 61–80 years there were 31 male and 36 female subjects. All five subjects in the age group >80 years were female.

Table 1: Age wise gender distribution of the study population (n = 485).

	Male	Female	Total (Percent)
<1 years	7	7	14 (2.89%)
1-20 years	46	30	76 (15.67%)
21-40 years	54	109	163 (33.61%)
41-60 years	49	111	160 (32.99%)
61-80 years	31	36	67 (13.81%)
>80 years	0	5	5 (1.03%)

Out of a total of 485, there were 187 male subjects (38.56%) and 298 female subjects (61.44%) as shown in Table 1. As it is clear from the above table that in age group <1 year there were 2.89% subjects, in 1-20 years there were 15.67% subjects, in 21-40 years there were 33.61% subjects, in 41-60 years there were 32.99% subjects, in the age group 61-80 years, there were 13.81% subjects whereas in the age group more than 80 years there were 1.03% subjects.

Out of 263 patients who had frank deficiency (vitamin D levels <20ng/dl), 92 were male and 171 were female, whereas out of 98 patients who had insufficient vitamin D levels (21 to 29ng/dl), 44 were male and 54 were female. One hundred and twenty four subjects had normal vitamin D levels out of which 51 were male and 73 were female subjects. Vitamin D deficiency was seen in 74.44% subjects out of which 54.22% had frank vitamin D deficiency (<20ng/dl) whereas 20.22% had insufficient vitamin D levels (21-29 ng/dl). About twenty five percent of the study population had normal vitamin D levels (>30 ng/dl). Out of 54.22% subjects who had frank vitamin D deficiency 18.96% were male and 35.26% were female, whereas out of 20.22% subjects who had insufficient vitamin D levels 9.08% were male and 11.14% were female. A total of 25.56% had normal vitamin D levels out of which 10.51% were male and 15.05% were female.

Out of the total study population of 485, 54.22% (n=263) had frank deficiency of vitamin D, 20.22% (n=98) had insufficient vitamin D levels and 25.56% (n=124) had normal vitamin D levels which has been shown in the pie diagram above. In the age group less than 1 year there were 14 subjects with 4 each in the deficient and insufficient categories with equal sex distribution. Six infants had normal vitamin D levels. In the group 1-20 years which numbered 76, more than half had levels

below 20 ng/dl, with 22 male and 19 female being vitamin D deficient. Sixteen subjects, 11 male and 5 female, had insufficient vitamin D levels in this group.

Table 2: Prevalence of vitamin D deficiency and its variation with gender (n=485).

	Male (Percent)	Female (Percent)	Total (Percent)
<20ng/dl	92 (18.96%)	171 (35.26%)	263 (54.22%)
21–29ng/dl	44 (9.08%)	54 (11.14%)	98 (20.22%)
> 30ng/dl	51 (10.51%)	73 (15.05%)	124 (25.56%)

Table 3: Pattern of vitamin D levels and its variation according to age and sex in the study population.

	<20ng/dl			21-29ng/dl			>= 30ng/dl		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
<1 year	2	2	4	2	2	4	3	3	6
1-20 years	22	19	41	11	5	16	13	6	19
21-40years	33	65	98	15	26	41	6	18	24
41-60years	23	62	85	11	15	26	15	34	49
61-80years	12	20	32	5	5	10	14	11	25
>80years	0	3	3	0	1	1	0	1	1

In the age group 21-40 years, this had maximum number of subjects (163) as many as 98 had frank vitamin D deficiency with two third female majority. In this age group, vitamin D insufficiency was found in 41subjects again with nearly two third female majority. A meagre 24 subjects had normal vitamin D levels.

In the next age category (41-60 years) which had 160 subjects, more than half were vitamin D deficient with female preponderance here too with 62 female subjects out of the total of 85. Twenty six were vitamin D insufficient in this group with 11 male and 15 female subjects. Forty nine subjects had normal vitamin D levels.

In the age group 61-80 years, there were 67 subjects. Thirty two had frank vitamin D deficiency with 20 female and 12 male subjects whereas 10 had insufficient levels with equal sex distribution. Eleven patients had normal vitamin D levels with male preponderance. Out of the five octogenarians, all were female. Three had frank vitamin D deficiency and one each had insufficient and normal levels. Pattern of vitamin D levels and its variation according to age and sex in the study population is shown in Table 3 and in the Histogram below.

DISCUSSION

Vitamin D is a unique nutrient whose deficiency causes one of the most widespread spectrum of human diseases ranging from those known from time immemorial like rickets and osteoporosis to the hundreds of diseases which are now linked to hypovitaminosis D, like diabetes, hypertension, various cancers, tuberculosis, preeclampsia, depression, etc.[20]

In present study, hypovitaminosis D (vitamin D deficiency and vitamin D insufficiency) was observed in 74.44% of the study population. This is similar to many published articles which relates to vitamin D deficiency in the Indian population.[21-25]

The mean value of vitamin D in our subject was 22.36ng/ml. Another recent Indian study involving a large number of subjects (n= 26,346) had similar finding.[21] In the study by Shah P et al the mean vitamin D_3 level was only 9.36ng/ml.[23]

Another important finding in our study is that hypovitaminosis was more common in females as compared to the males.

Extra attention to their diet as well as vitamin D supplementation is warranted to avoid long term complications in the female gender, keeping in mind the increased need due to pregnancy and lactation. In pesent study maximum `number of subjects was in the age group of 21-40 years followed closely by the age group 41-60 years. This is again similar to the observation made in previous studies.[21,23]

It is interesting to note that the decades spanning from 21 years to 60 years of age are one of the most productive years in the life of a human being. It is also the period which is most challenging and rewarding as well. Deficiency of a vital nutrient like vitamin D has the potential to have an adverse impact in this crucial phase of life. Hypovitaminosis D perhaps heralds a cascade which finally leads to the chronic diseases as described in the beginning.

CONCLUSION

To conclude, vitamin D deficiency was seen in 74.44% of our study population with a mean value of 22.36 ng/ml. This further reiterates the fact that hypovitaminosis D is a common problem in India and our region is no exception.

Although this problem does not spare any age group as seen in our study, the most affected age groups were those in the 21 -40 years and 41-60 years, with a female predominance. Hence, medically monitored supplementation of vitamin D on a regular basis in this age group along with lifestyle modifications may have a positive long term impact and perhaps act as 'vaccine' to prevent the diseases that are presently plaguing not only the Indian population, but the human civilization at large.

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