



ORIGINAL RESEARCH PAPER

Medicine

CLINICAL STUDY OF VITAMIN D DEFICIENCY IN TYPE 2 DIABETES MELLITUS, HYPERTENSION AND CHRONIC KIDNEY DISEASE PATIENTS

KEY WORDS: Vitamin D, DM(diabetes mellitus),hypertension, CKD(chronic kidney disease).

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ABSTRACT

Vitamin D is an essential nutrient, a fat soluble vitamin and is known for its role in calcium homeostasis, which is vital for optimal skeletal health. Epidemiological studies have suggested a higher prevalence of metabolic syndrome and its components among individuals with vitamin deficiency. Humans get Vitamin D from exposure to sunlight, from their diets, and from dietary supplements. Calcium is actively absorbed from the small intestine in the presence of Vitamin D. Vitamin D refers to Vitamin D2(ergocalciferol) or Vitamin D3(cholecalciferol). The best marker of Vitamin D status is the serum 25-hydroxyvitamin D concentration. The 25-hydroxyvitamin D level is measured in patients with suspected Vitamin D deficiency. This study was undertaken to determine the prevalence of Vitamin D deficiency in general and the comparison of this data with type 2 DM , hypertensive and chronic kidney disease patients, patients were divided into 4 groups and a prospective, observational, open and controlled study was conducted on indoor and outdoor patients with the conclusion being that there was a significantly lower level of Vitamin D in patients with type 2 Diabetes mellitus

INTRODUCTION:

Vitamin D is an essential nutrient, a fat soluble vitamin, the synthesis of which depends upon multiple factors like latitude, atmospheric pollution, clothing, skin pigmentation and the duration and time of exposure to sunlight. Vitamin D deficiency is defined as a serum 25-hydroxyvitamin D level of less than 20ng/ml(50nmol/L) and insufficiency is defined as a serum 25-hydroxyvitamin D level of 20-30ng/ml(50-75mmol/L). Serum level of 30-100ng/ml of 25(OH)D is defined as sufficient level in humans. More than 100ng/ml in serum is defined as toxic level(1). India is a vast tropical country extending from 8.4 N latitude to 37.6 S latitude. Majority of its population lives in areas receiving ample sunlight throughout the year and hence there was a disbelief that Vitamin D deficiency is uncommon in India(2). However, from the data in published literature, Vitamin D deficiency is very common in India in all the age groups and both sexes across the country(3,4). The FAO/WHO Expert consultation (5) states that in most locations of the work between 42 degree N and 42 degree S latitude there is abundant sunshine. This is responsible for physiological production of Vitamin D endogenously in the skin from 7-dehydrocholesterol present in the subcutaneous fat. Thirty minutes of exposure of the skin over the arms and face to sunlight, without application of sunscreen, preferably between 10 am to 2 pm(as maximum ultraviolet B rays are transmitted during this time) daily is adequate to avoid vitamin D deficiency(6). Certain population studies find that people who have lower levels of vitamin D are more likely to develop type 2 DM than people with sufficient levels, but there is no evidence that taking Vitamin D can help prevent or treat type 2 DM(7). A study(8) published in June 2010, found that in type 2 DM patients, vitamin supplementation can increase insulin sensitivity and decrease inflammation. Another study(9) in USA, showed that after adjusting for Vitamin D supplementation, sex, age, body mass index and HCV co-infection in HIV patients; Vitamin D deficiency was associated with Type 2 DM. In population studies, people with low levels of Vitamin D seem to have a high risk of developing high blood pressure than those with higher/sufficient levels of Vitamin D. A meta-analysis(10) showed that men with a vitamin D concentration less than 15ng/ml, were three times more prone to develop hypertension. An Indian study(11) showed that Vitamin D supplementation has a role in reducing blood pressure in hypertensive patients. With regards to chronic kidney disease, a study(12) showed very low levels of Vitamin D in CKD patients as compared to those without CKD and these subjects also had a higher level of parathyroid hormone. A large scale study (13) concluded that having low levels of vitamin D (<17.8ng/ml) was

independently associated with an increase in all cause mortality in the general population. Thus taking the recent studies into account and the highlighted importance and multiple roles of vitamin D as an essential nutrient, it was necessary to have a clinical study of vitamin D deficiency in CKD, hypertensive and Type 2 DM subjects.

METHODS AND MATERIALS:

The prospective, observational, open and controlled study was conducted on indoor and outdoor patients, in the Department of Medicine, Gandhi Medical College and Hamidia Hospital. The study was approved from the ethics committee of the institute and informed consent was obtained from the patients. The study groups were divided into 4 as follows- group 1(20 healthy controls), group 2(56 cases- 27 with type 2 DM alone and 29 with both type 2 DM and hypertension), group 3(26 cases with hypertension alone)and group 4(47 cases with CKD), the study was planned to compare the serum 25(OH)vitamin D deficiency in 130 cases, to compare the prevalence of vitamin D deficiency in cases and control groups and to estimate the prevalence of vitamin D deficiency in apparently healthy population.

RESULTS AND DISCUSSION:

The results of serum vitamin D levels in the various groups were compared and analysed,

The age and sex wise distribution with vitamin D levels in patients with type 2 DM showed a mean value of 8.56ng/ml±1.350 which was significant statistically when compared to controls

Table 1

S.No.	Age group(years)	MALE			FEMALE		
		N	%	Mean vit D Level(ng/ml)	N	%	Mean vit D level(ng/ml)
1	13-22	0	0	0	0	0	0
2	23-32	3	11.12	9.03	1	3.7	7.81
3	33-42	6	22.24	8.994	4	14.8	8.93
4	43-52	4	14.81	9.022	1	3.7	6.25
5	53-62	6	22.24	7.581	0	0	0
6	63-72	1	3.7	11.35	1	3.7	7.25
	Total	20			7		

Table 2

This table shows 47 CKD cases with a mean value of vitamin D-11.846 ng/ml±2.015 with a p value <0.0001 which is extremely significant with higher levels of mean values of vitamin D in CKD patients, as they were on vitamin D supplements.

S.NO	Age group(y ears)	Male			Female		
		n	%	Mean vitamin D level(ng/ml)	n	%	Mean vitamin D level(ng/ml)
1	13-22	3	6.3	9.35	0	0	0
2	23-32	9	18.9	13.568	3	6.3	12.227
3	33-42	4	8.5	12.497	8	17.1	11.892
4	43-52	6	12.6	10.811	3	6.3	11.323
5	53-62	4	8.5	10.610	3	6.3	10.214
6	63-72	4	8.5	13.220	0	0	0
	total	30			17		

In reference to the other groups, one with 26 hypertensive cases, the mean value of vitamin D-8.532ng/ml±2.322 as compared to controls was non-significant, and also in the group with 29 patients who had Type 2 DM and hypertension both, the mean value of vitamin D- 8.597ng/ml±2.154 was also non significant. On comparing the present study with other studies(14,15,16), it was found that the average vitamin D level was 9.684ng/ml in control group, while it was 9.668ng/ml in the study group, which was not statistically significant, while the other studies(14,15,16) did not have a control group, but the disease group had an average vitamin D of 7.98nmol/L.

CONCLUSION:

According to our study we conclude that, vitamin D level was significantly low in the diabetic group(group 2) as compared to controls while it was high in CKD group(group 4) due to vitamin D supplementation in that group, in the hypertensive group(group 3), no significant difference was found as compared to the control group. Thus these findings elaborate the need to analyse and investigate levels of Vitamin D which will help in prevention and treatment of vitamin D deficiency.

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