STUDY TO EVALUATE THE VITAMIN D SCENARIO IN AN INDIAN POPULATION

Neurology

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ABSTRACT

Introduction : Till the 20th century deficiency of vitamin D which is synthesized in the skin upon exposure to UVB light was largely unknown. But today vitamin D deficiency has taken an epidemic form and is linked with many disease conditions. Several studies have put forward a very high prevalence of vitamin D deficiency among Indians of all age groups.

Aims and objectives : To study the vitamin D status of people visiting a tertiary care centre in India.

Materials and Methods : This is a prospective observational study conducted in the Biochemistry section of Central Clinical Laboratory of Gauhati Medical College & Hospital (GMCH). All the vitamin D reports generated in the laboratory for a period of 9 months were recorded and analysed to estimate the prevalence. Similar to other vitamin D studies, 20ng/ml was taken as the cut-off for vitamin D deficiency, 30ng/ml for insufficiency, and 30-100ng/ml as the normal vitamin D range.

Results and Observations : In this study Vitamin D data of 1000 patients admitted in GMCH was analysed. Of them females outnumbered males (68.7% vs 31.3%). Of the 1000 vitamin D reports analysed 51.9% were found to be in the insufficient range, followed by 30.1% in the normal range. In 17.5% vitamin D levels were found to be deficient. Vitamin D status was found to be lower in females as compared to males. 86.75% of females were either vitamin D deficient or insufficient and 71.88% of males were either deficient or insufficient.

Conclusion : In this study 17.5% of study subjects had vitamin D level <20ng/ml, which may be considered as deficient, as per the Institute of Medicine (IOM) which considers a serum vitamin D value of 20 ng/ml as optimal. According to the U.S. Endocrine Society 30 ng/ml is optimal. Due to this variation the recommended daily intakes of this nutrient also vary.

KEYWORDS

Vitamin D, Deficiency, Insufficiency.

INTRODUCTION :

Vitamin D is a fat soluble steroid hormone that comes in two forms, vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol). Vitamin D is synthesized in the skin upon exposure to UVB sunlight or we get it through our diet. It is hydroxylated in the liver and then in the kidney to form the active form i.e. 1,25 (OH)₂ vitamin D. Till the 20th century Vitamin D deficiency was largely unknown. But today there is a large hue and cry regarding vitamin D deficiency taking an epidemic form just after diabetes mellitus and thyroid disease. Advanced techniques of vitamin D estimation and changing life style of the people because of which they are mainly restricted indoors may be the two factors responsible for the spurt in vitamin D deficiency. Several studies have reported a very high prevalence of vitamin D deficiency in different populations across the world. Apart from low dietary intake, people suffering from hepatic, renal, dermatological disorders, alcoholics and inflammatory rheumatological conditions also have Vit D deficiency. In the late 18th century vitamin D was first recognized as an essential dietary component in the prevention of rickets. But today it is linked with many disease conditions like cardiovascular disease, diabetes mellitus, cancer, tuberculosis, and autoimmune diseases among others, as has been brought forward by new research done in this field. India being in the tropical region receiving ample amounts of sunlight a high prevalence of vitamin D deficiency is highly unexpected. But several studies have put forward a very high prevalence of vit D deficiency among Indians of all age groups (1-3). Vitamin D deficient status can be corrected by augmenting its synthesis in the skin by exposing the skin to sunrays or by supplementation or fortification of food. But before taking any such steps we have to have a correct understanding of the status of vitamin D levels in the population concerned. There are no such studies which have studied the prevalence of vitamin D deficiency in this part of the Indian subcontinent. However it is seen that vitamin D is being prescribed haphazardly without individual assessment considering it to be widely prevalent. This study is a small step towards understanding the vitamin D scenario in this part of the country.

Aim : i) To study the vitamin D status of people visiting a tertiary care centre in India.

MATERIALS AND METHODS :

STUDY DESIGN :

Type of study : This study was planned as a prospective observational study.

Place of study : Biochemistry Section of Central Clinical Laboratory of Gauhati Medical College & Hospital (GMCH). Gauhati Medical College & Hospital is a tertiary level referral hospital and this study was aimed at studying the vitamin D status of patients and attendants visiting GMCH.

Study Period : The study was conducted for a period of 9 months from July 2019 to March 2020.

Study protocol : All the vitamin D reports generated in the laboratory were recorded and analysed on a daily basis. The samples which were analysed were of patients visiting the hospital. The vitamin D reports of normal control population of a study on vitamin D conducted in the laboratory was also included in the study. Particulars regarding the patients name, age, sex, location and disease he/she was suffering from was collected from the requisition form sent to the laboratory along with the blood sample.

Vitamin D estimation : 1,25(OH)₂ vitamin D is 1000 times lower than 25(OH) vitamin D and has a half life of 4 hours. Due to its half life of 2-3 weeks 25(OH) vitamin D is the metabolite that is the most reliable clinical indicator of vitamin D status. Also 25(OH) vitamin D levels are indicative of the body's storage levels of vitamin D and correlate well with the clinical symptoms of vitamin D deficiency. Serum 25(OH)D was estimated using the Vitros 25(OH)D total reagent pack on the Vitros 5600 Integrated System. A competitive immunoassay technique is used which involves the release of the 25(OH)D in the sample from the binding protein using a low pH denaturant and the subsequent competition of the free 25(OH)D with HRP labelled 25(OH)D reagent for the monoclonal anti-vitamin D bound to the wells. Calibration of the reagent was done every 28 days and one level of control was run with each batch of assay.

Reference Range : Vitamin D < 20 ng/ml ---- Deficient
20ng/ml - 30ng/ml --- Insufficient
30 ng/ml - 100ng/ml --- Normal

RESULTS & OBSERVATIONS :

Fig 1 : Vitamin D status among the study participants.

Table 1 : Age wise distribution of vitamin D status :

Age (Yrs)	Total Num bers	Vitamin D mean±SD	Breakup of Vitamin-D status							
			Deficient		Insufficient		Normal		Toxic	
			Nos	%	Nos	%	Nos	%	Nos	%
Upto 15	69	35.03±0.54	7	10.14	25	36.23	37	53.62	0	0
15-30	191	32.84±1.07	46	24.08	92	48.17	53	27.75	0	0
31-45	297	28.86±1.55	39	13.13	153	51.52	105	35.35	0	0
46-60	303	25.14±2.11	54	17.82	172	56.77	74	24.42	3	0.99
>60	140	30.05±0.74	29	20.7	77	55	32	22.86	2	1.43

Table 2 : Genderwise distribution of Vitamin D status :

Vitamin D	Male		Female	
	Numbers	%	Numbers	%
Deficient	68	21.73	203	29.55
Insufficient	157	50.16	393	57.21
Normal	86	27.48	91	13.25
Toxic	2	0.64	0	0.0
Total	313	100	687	100

DISCUSSION :

With the advent of new methods of Vit D estimation, low levels of vit D is increasingly being looked at as a causative factor of non-communicable diseases. Various studies conducted therein to evaluate the Vit D status, have likewise revealed a wide prevalence of vitamin D deficiency. India being located in the tropical zone with ample amount of sunlight, its population should have been vitamin D sufficient but on the contrary studies have revealed a poor vitamin D status of the population at large(4). This present study is an extension of such prevalence studies and was aimed at getting an ideal picture of vitamin D status of the Indian population in this North-Eastern part of the country.

In this study 1000 Vitamin D data obtained from Central Laboratory of GMCH was analysed. Of them females outnumbered males (68.7% vs 31.3%). Most of the vitamin requisitions of female participants were of antenatal cases received from the Obstetric department. In the age-wise break-up of the study participants, maximum were in the age group of 46-60 years, followed by 31-45 years.

Of the 1000 vitamin D reports analysed 51.9% were found to be in the insufficient range, followed by 30.1% in the normal range. In 17.5% vitamin D levels were found to be deficient. Vitamin D reports of 5 patients were more than 100. Similar to other vitamin D studies, 20ng/ml was taken as the cut-off for vitamin D deficiency, 30ng/ml for insufficiency, and 30-100ng/ml as the normal vitamin D range. These reference ranges are provided by the company supplying the kit. The prevalence of vitamin D deficiency (moderate and severe) and sufficiency is quite similar to other studies.(5,6) In a similar prevalence study conducted in a tertiary care hospital, 74.7% people were found to be either deficient or insufficient and 25.3% were vitamin D sufficient(7).

Vitamin D status was found to be lower in females as compared to males. 86.75% of females were either vitamin D deficient or insufficient and 71.88% of males were either deficient or insufficient. 57.21% of females were vitamin D insufficient as compared to 50.16% males. Previous studies of vitamin D status in women of both reproductive age group and post-menopausal women have reported a high percentage of vitamin D deficiency. Vitamin D deficiency status was found to be similar in rural and urban women(6,8). Female study participants were mainly of child bearing age in the age group of 15-45 years, and low sun exposure may be one of the factors responsible. Adequate sun exposure has been shown to have a positive correlation with vitamin D status. (9,10).

In 5 patients the vitamin D reports were found to more than 100ng/ml. Follow-up of the patients when done revealed that they were on regular vitamin D supplements for several months, taking vitamin D to toxic levels.

During this time of Covid pandemic maintaining a normal Vitamin D level becomes all the more important. This is so because studies have shown that a daily or weekly vitamin D dose between 20µg and 50µg resulted in a significant reduction of respiratory tract infections.(11).

In this study vitamin D insufficiency was found more than deficient. Vitamin D insufficiency was defined as vitamin D level between 20-

30ng/ml. Reference range for the Indian population is not defined as yet. In the absence of population based reference ranges categorizing them as insufficient will be unwarranted.

A vitamin D status below 20ng/ml should be treated to achieve a minimum level of 30 ng/ml. Values around 30ng/ml are considered optimal with respect to skeletal activities(12).

CONCLUSION :

We know that the normal levels of different analytes vary in different age groups as also in different populations according to the location. Vitamin D is a very good example as its level in blood is influenced by diet and the environmental conditions of the region, it being synthesized in the skin following exposure to sunlight. There are no such studies which have brought forward the normal level of vitamin D in the Indian population though there are studies which have studied the prevalence of vitamin D deficiency in different Indian populations. All such studies have utilized the reference range provided by the reagent and analyzer manufacturer, which are again not based on the Indian population. This however results in bias in the interpretation of vitamin D status and thereby calculation of the prevalence.

The requirement of vitamin D in an individual and its healthy level is also a subject of debate. As per Institute of Medicine (IOM), a serum vitamin D value of 20 ng/ml is considered optimal in human adults whereas according to the U.S. Endocrine Society 30 ng/ml is optimal (13,14). Due to this variation the recommended daily intakes of this nutrient also vary.

Declarations :

Acknowledgement :

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