ORIGINAL RESEARCH PAPER

Volume-8 | Issue-7 | July - 2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EVALUATION OF VITAMIN D STATUS AMIDST MEDICAL PROFESSIONALS OF A TERTIARY CARE HOSPITAL

Endocrinology

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ABSTRACT

Background: Vitamin D deficiency is recognized as a Global problem irrespective of the gender, age, race and geography. Professionals like Doctors are vulnerable to low vitamin D levels due to long work hours and lack of sun exposure.

Aim: To evaluate Vitamin D 3 status among the Doctors of a tertiary care hospital. To correlate Vitamin D levels with the demographic characters, life style and sun exposure levels.

Material & Method: This Prospective cross sectional study was carried out among 50 Doctors over a period of six months. The participants, were given a questionnaire and asked to fill the details of their life style including sun exposure levels. Serum Vitamin D3 levels were assessed using Carbonyl metallo immunoassay method.

Statistical analysis Used: Data was analysed and expressed in terms of descriptive statistics. Correlation analysis (Pearson's) was used to identify the correlates of vitaminD3 using Graph Pad Prism version 7 software.

Result: Vitamin D3 deficient status was observed in 90 %(n=45) of Doctors, insufficiency among 6 %(n=3) and normal levels in only 4 %(n=2). There was a significant correlation between Vitamin D3 deficiency and gender ($P<0.03$, 95% CI 0.07 – 0.99); between Vitamin D3 sufficiency and sun exposure level ($P<0.04$, 95% CI -0.11 – 0.99).

Conclusion: Vitamin D3 deficiency is more prevalent globally even among healthy individuals, which if not treated, can lead on to health derangement in future. Our study has highlighted the deficient status of Vitamin D3 among medical professionals in Puducherry. As doctors, awareness about our Vitamin D3 deficiency should be revolutionised, find way to overcome it by appropriate supplementation and life style reforms, which helps to treat the patients in the same line.

KEYWORDS

Vitamin D, Deficiency, Doctors, life style.

INTRODUCTION:

Vitamin D deficiency is recognized as a Global problem irrespective of the gender, age, race and geography. This is documented even in a sunny Mediterranean country like Israel[1]. Doctors are vulnerable to low vitamin D levels due to long work hours and lack of sun exposure. From a recent study, around 95% of people are found to have deficient levels of Vitamin D (particularly office workers and elderly).[1] In Developed countries like USA and Canada food fortification strategies with vitamin D have been only partially effective and have largely failed to attain vitamin D sufficiency.[2]

The overall prevalence rate of vitamin D deficiency in US was 41.6%, with the highest rate seen in blacks (82.1%), followed by Hispanics (69.2%).[3] A high prevalence of 39% vitamin D deficiency in otherwise healthy young adults was noted among UK population also.[4] In Australian population the deficiency levels of Vitamin D was 22.7% of the population.[5] Vitamin D deficiency prevails in epidemic proportions all over the Indian subcontinent, with a prevalence of 70%–100% in the general population. Recent scientific evidence endorses that vitamin D is a potent health-boosting substance and its importance for health and survival. The other health benefits of Vitamin D includes, maintaining immune system, mood enhancer, pain alleviation, prevents cancer development, bone strengthening, to treat Diabetes and for promoting weight loss.[6-10]

The nutrition world is on to the Vitamin D revolution and the awareness about Vitamin D is increasing day by day. The number of people taking supplements of Vitamin D has also increased tenfold over the last few years.

In particular, doctors due to their inadequate sun exposure, poor outdoor activity and busy work schedule could contribute to vitamin D3 deficient status. In addition there is limited information about vitamin D 3status among medical professionals. Hence, we planned to do a research to assess the Vitamin D deficit among the Doctors of a tertiary care hospital and correlate it with their demographic characters, life style and sun exposure level. We hope it might create awareness and pave way for improvement of Vitamin D revolution.

Aim:

To evaluate the status of Vitamin D 3 among the medical professionals of a tertiary care hospital in Puducherry.

Objectives:

To study and assess the levels of Vitamin D3 among the medical professionals.

To correlate the levels of Vitamin D3 with the demographic characters, life style and Sun exposure levels among them.

MATERIALS AND METHODS:

This was a prospective cross sectional study conducted among fifty medical professionals (Doctors) from January 2017 to June 2017 in a tertiary care teaching hospital, Puducherry, India. Doctors who had qualified M.B.,B.S., degree, with or without post graduate degree, with age group 22-60 years, both gender and who were able to comply with the study proceedings were included in the study. Doctors who are already on Vitamin D3 supplementation and with other co-morbid clinical conditions like, Chronic kidney disease, inflammatory bowel disease, celiac disease, gastric bypass surgery, cystic fibrosis/ pancreatic insufficiency and gall bladder dysfunction were excluded. All the Doctors who fulfilled the inclusion and exclusion criteria were

taken for this study after getting a written informed consent from them. Convenient sampling method was used. The present study was approved by the Scientific research committee & Institutional Ethics Committee (IEC No: IEC/2015/25). Confidentiality was maintained throughout the study. The participants were given a case record form and explained in brief about the same, and were asked to fill the form appropriately during their free time and return it back.

The dietary pattern and the sun exposure levels were assessed using closed ended questionnaire to the participants in the case record form adopted from the literature.[11-13] (Annexure1) Then 4 ml of venous blood sample was collected in a plain blood collecting tube without any anticoagulant from the participants for analyzing serum vitamin D3 levels. The whole blood sample was stored at -20 degree Celsius until drawn for analysis. Serum Vitamin D3 levels were quantified using CMIA (Carbonyl Metallo Immunoassay) method in automated analyzer. The test measured 25(OH) Vitamin D3 levels. The guidelines[14] for serum (blood) 25(OH) D3 levels are as follows.

1. Deficiency : 25(OH)D level is below 20 ng/mL (inclusive)
2. Insufficiency : 25(OH)D level is between 21-29 ng/mL
3. Sufficiency : 25(OH)D level is between 30-50 ng/mL
4. Excessive : 25(OH)D level over 50 ng/mL

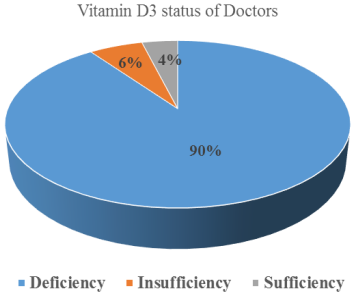
Statistical analysis:

Quantitative data were analysed in terms of descriptive statistics like mean and standard deviation for vitamin D3 levels. Multiple regression analysis was done to find correlation (Pearson's) between vitamin D3 deficiency and the diet and sun exposure levels. Statistical analysis was carried out using Graph Pad Prism version 7 software. P value of < 0.05 was considered as statistically significant.

RESULTS:

Among the study participants, 50% were male and 50% were female. Based on the above study it was noted that, out of 50 medical professionals, 90%(n=45) of the doctors have Vitamin D3 Deficiency, 6%(n=3) have insufficiency of Vitamin D 3 and only 4%(n=2) of the doctors were having sufficient levels of Vitamin D 3 levels. (Figure:1)

Figure 1: Depicting the Vitamin D3 status of Doctors in percentage.



Among the demographic characteristics it was found that there was no statistically significant difference among the different age groups of medical professionals and 25 OH Vitamin D 3 levels. Both male and female doctors had nearly equal deficiency levels of Vitamin D3. But there was a significant correlation (P value<0.03, 95% CI 0.07 – 0.99) between the vitamin D 3 sufficiency group and male gender factor. Thus male doctors had sufficient Vitamin D3 levels when compared to female Doctors. (Table:1)

Table 1: Gender wise distribution of doctors in accordance with Vitamin D3 levels

Sex	Number of Doctors (n=50)	25(OH) Vitamin D3 level (Mean ± SD)	Vitamin D3 deficiency % (n)	Vitamin D3 insufficiency % (n)	Vitamin D3 sufficiency % (n)
Male	25	16.24 ± 6.37	84% (21)	8% (2)	8% (2)
Female	25	14.44 ± 2.84	96% (24)	4% (1)	0% (0)
P Value			0.1542	0.4084	0.0391*

[Foot Note: Data analysed using Graph Pad Prism version 7 software. Multiple regression analysis was done to find correlation (Pearson's).*p value is significant. P value of < 0.05 was considered as statistically significant.]

The sun exposure pattern of the individual Doctors were analysed, though most of them stayed under shade often and it was found out that no significant correlation between Vitamin D 3 deficiency levels and duration of sun exposure from 30 minutes upto two hours. But there was a significant correlation (P<0.04, 95% CI -0.11 – 0.99) between Vitamin D3 sufficiency levels and duration of sun exposure (>2 hours / week). Thus Doctors who had sun exposure level of > 2 hours duration/week had sufficient levels of Vitamin D3 as shown in Table: 2.

Table 2: Sun exposure/ week and 25(OH) Vitamin D3 levels:

	Sun Exposure/week	Number of Doctors (n=50)	Vitamin D 3 levels (mean ± SD)	Vitamin D3 Deficiency (n)	Vitamin D3 Insufficiency (n)	Vitamin D3 Sufficiency (n)
1	30 min	38	12.24 ± 5.42	100 % (38)	0 % (0)	0 % (0)
2	30 min -1 hour	6	15.58 ± 4.22	83.5% (5)	16.5% (1)	0%
3	1-2 hours	4	21.45 ± 1.89	50 % (2)	50 % (2)	0%
4	>2 hours	2	35.12 ± 1.28	0 % (0)	0%	100 % (2)
			P value	0.0954(ns)	0.8677(ns)	0.0488(s)*

[Foot Note: Data analysed using Graph Pad Prism version 7 software. Multiple regression analysis was done to find correlation (Pearson's). *p value is significant(s). P value of < 0.05 was considered as statistically significant.]

Table: 3 and 4, shows the analysis of the dietary intake of Vitamin D 3 rich food consumed and Vitamin D 3 levels, it was found out that there was no significant difference or correlation between the Deficiency and Sufficiency group of Doctors. We found no difference or correlation between the Vitamin D 3 levels and factors like use of sunscreen, full sleeved clothing stay in shade, skin colour and deficiency symptoms.

Table 3. Vitamin D rich food consumed/month and 25(OH) Vitamin D3 levels:

	Vitamin D rich Food onsumed/month (n=50)	Vitamin D 3 levels (mean ± SD)	Average consumption	Vitamin D3 Deficiency % (n)	Vitamin D3 Insufficiency % (n)	Vitamin D3 Sufficiency % (n)	P value
1	Mushroom	13.44 ± 6.42	Once a month	77% (17)	13.5% (3)	9.5% (2)	1.0# (ns)
2	Cheese	14.80 ± 5.42	Twice a month	80% (20)	12% (3)	8% (2)	
3	Fish	15.45 ± 4.32	Once a week (100% of Non-vegetarians)	87% (33)	8% (3)	5% (2)	
4	Egg	15.45 ± 4.32	4 times/week (100% of Non-vegetarians)	87% (33)	8% (3)	5% (2)	
5	Cereals	12.34 ± 3.12	Twice a week (100% of vegetarians)	70.5% (12)	17.5% (3)	14% (2)	
6	Soy milk	13.54 ± 2.13	Less than once a month	71 % (5)	14.5% (1)	14.5% (1)	
7	Fortified Milk	14.26 + 4.49	Thrice a month	81% (21)	11.5% (3)	7.5% (2)	

[Foot Note: Data analysed using Graph Pad Prism version 7 software. Multiple regression analysis was done to find correlation (Pearson's). #p value is non-significant(ns). P value of < 0.05 was considered as statistically significant.]

Table 4: Comparison with other characteristics and 25(OH) Vitamin D3 levels:

Characteristics (N=50)	Vitamin D 3 levels (mean ± SD)	Vitamin D3 Deficiency % (n)	Vitamin D3 Insufficiency % (n)	Vitamin D3 Sufficiency % (n)	P value
Use of Sunscreen (30%)	12.11 ± 3.14	100 % (15)	0 % (0)	0 % (0)	0.33# (ns)
Use of full sleeved clothing (50%)	13.22 ± 3.32	96% (24)	4% (1)	0% (0)	
Stay in shade (often) (100%)	15.35 ± 5.12	90 % (45)	6% (3)	4% (2)	
Skin Colour (light to dark brown) (86%)	14.54 ± 5.43	93 % (40)	2 % (1)	5 % (2)	
Deficiency Symptoms (30%)	12.34 + 4.62	100 % (15)	0 % (0)	0 % (0)	

[Foot Note: Data analysed using Graph Pad Prism version 7 software. Multiple regression analysis was done to find correlation (Pearson's). #p value is non-significant(ns). P value of < 0.05 was considered as statistically significant.]

Table 5: Correlation Of 25 OH Vitamin D 3 levels with different factors:

Sl.NO.	Factor	Pearson's Correlation Coefficient	P value	Significance
1	Age	-0.7381	0.15#	Non-Significant
2	Sex	0.8970	0.03*	Significant
3	Sun Exposure	0.9512	0.04*	Significant
4	Food Habits	0.0281	0.84#	Non-Significant

[Foot Note: Data analysed using Graph Pad Prism version 7 software. Multiple regression analysis was done to find correlation (Pearson's correlation).*p value is significant(s). #p value is non-significant(ns). P value of < 0.05 was considered as statistically significant.]

On applying Pearson's correlation analysis, it was noted that there was a significant correlation only between the Vitamin D 3 levels and sex and sun Exposure factor (Table 5).

DISCUSSION:

Our analysis demonstrated 90% of the Doctors had deficiency of 25 OH Vitamin D3. This high level of deficiency status should be notable and could be explained by a lesser exposure to sunlight, limited physical activity and deficient dietary intake. The knowledge about their own vitamin D3 level may change their approach towards vitamin D treatment in daily practice and draws more attention towards their patients. These findings are in consistence with similar studies conducted in Mediterranean countries, which showed a deficiency percentage of 92% and 98% among medical residents in tropical regions in North India and among healthy individuals in different parts of India.[15-17] In another study conducted in Israel, vitamin D levels of physicians were assessed and found that Vitamin D levels were lower in the hospital-based physicians than the community based ones with overall deficient status of 67%.[1] In our study no statistically significant difference was observed among the different age groups and gender. Significant correlation (P value<0.03, 95% CI 0.07 – 0.99) between the vitamin D 3 sufficiency group and male gender was observed. Thus, male doctors had sufficient Vitamin D3 levels when compared to female Doctors. Epidemiology studies had shown that men typically have higher serum 25(OH) Vitamin D 3 levels than women.[18,19] However, few other studies have also reported that there is no gender difference in 25(OH) Vitamin D 3 levels.[20]

Significant correlation (P<0.04, 95% CI -0.11 – 0.99) was noted between Vitamin D3 sufficiency levels and longer duration of sun exposure (>2 hours / week) with no correlation with sun exposure less than two hours. Since the vitamin D synthesised in the skin lasts two times longer in the body, spontaneous exposure to sunlight equivalent to 0.5 minimal erythemal dose(MED) to legs and arms, three times a week can render adequate amount of vitamin D.[21] Although it has been postulated that sun-induced summer increments in serum 25(OH) Vitamin D gradually decline over the winter, one study showed high summer sun exposure may maintain higher serum Vitamin D levels in the winter as well.[22,23] Our study estimated Vitamin D 3 levels during summer (month of April & May) and found a higher percentage of Vitamin D 3 deficiency. Symptoms of Vitamin D deficiency like muscle weakness, muscle pain & low back pain were noted in 30% of the Doctors in the present study. Hence, it is high time we consider this issue and awareness to be created among the medical professionals and public.

Fortified milk and other products rich in vitamin D are essential for the prevention and treatment of deficient status in addition to adequate sun exposure. Our study also analysed Vitamin D3 rich food consumed like fortified cereals, soy milk, fortified milk, cheese etc., and its correlation with Vitamin D3 levels which showed no significant association. A research stated that fortification of milk with vitamin D is required in United States. [12] These kinds of food fortifications with Vitamin D3 could be encouraged in country like India in addition to policymaking and public health recommendations.

An expert panel of the Indian Government gathered to revise and update the human nutrient requirements and concluded in their final draft, outdoor physical activity is a means of not only achieving adequate vitamin D but also useful for controlling overweight and obesity in Indian population. Only under situations of minimal exposure to sunlight, a daily supplement of 400 IU (10 g) is recommended.[19,24] But, based on our study results we would like to stress that due to limited exposure to sunlight and high demands of their profession, many medical professionals are at a huge risk of Vitamin D 3 deficiency and hence necessary steps has to be taken right away to create awareness about Vitamin D 3 deficiency and the ways of preventing and treating the same. A study has highlighted a lack of awareness about the importance of vitamin D, prevalence of vitamin D deficiency and its management even among medical students.[25] Henceforth we believe that our study might create awareness among health care professionals especially Doctors, which might lead on to life style modification and might revolutionize the problem of Vitamin D deficiency among them and to the patients they treat.

Strengths of our study include testing of individuals of both genders (equal male and female samples) from ages 22 to 60 years and uniform measurement of serum 25(OH) Vitamin D3 by a single assay at the same time of the day. Study weaknesses also exist as we did not record time of day of sun exposure, although it is known that both season and time of day influence cutaneous vitamin D 3 synthesis.[23] Additional research is also needed to refine the current questionnaire used in this study. A large sample size could have strengthened our study results.

CONCLUSION:

Vitamin D3 deficiency is more prevalent globally even among healthy individuals, which if not treated, can lead on to health derangement in future. Our study has highlighted the deficient status of Vitamin D3 among medical professionals in Puducherry. As doctors, awareness about our Vitamin D3 deficiency should be revolutionised, find way to overcome it by appropriate supplementation and life style reforms, which helps to treat the patients in the same line.

ACKNOWLEDGEMENT:

We acknowledge our Institute, Sri Venkateshwaraa Medical College Hospital and research Centre for supporting us right throughout this study.

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