ORIGINAL RESEARCH PAPER

General Medicine

ROLE OF VITAMIN D IN HYPOTHYRODISM

KEY WORDS: Hypothyroidism, TSH , VitaminD

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ABSTRACT

INTRODUCTION: Insufficiency of Vitamin D is a global health problem Vitamin D is a steroid which is formed by skin and it regulate the expression of various genes. Since both Vitamin D and thyroid hormones act via steroid receptors; so any alteration in the level of Vitamin D is possible to increase problems related with hypothyroidism. The association studies between Vitamin D insufficiency and primary hypothyroidism have given mixed results.

MATERIAL AND METHODS: this study was conducted in Rama Medical College. The study was conducted for duration of six month. This cross sectional study enrolled 100 subjects. Under absolute aseptic circumstances venous blood was drawn from anticubital vein. Levels of T3, T4 and TSH were estimated with the use of fluorescence array. To determine the levels of Vitamin D, 25(OH)D was calculated. All the data was set in a tabulated form and analyzed using SPSS software. Independent T Test was used for comparison.

RESULT: At the study baseline, we engaged 230 members; though, 30 patients were excluded from the study because of not fulfilling the inclusion criteria. In the current study,200 patients(n = 100) and placebo (n = 100)] in our study 59% patients have deficiency of vitamin D 21% patients shows insufficient in vitamin D .20%patients had sufficient level of vitamin D. There was a major disparity in the level of Vitamin D in all the cases.

CONCLUSION: Overall, the current study demonstrated that vitamin D have quite important relation with the hypothyroidism

INTRODUCTION

Insufficiency of Vitamin D is a global health problem Vitamin D is a steroid which is formed by skin and it regulate the expression of various genes.The main action of Vitamin D is regulation of calcium and phosphorus homeostasis. Studies have shown that Vitamin D deficiency is associated with increased risk of diabetes Mellitus, infectious diseases, atherosclerosisand autoimmune situation similar to autoimmune thyroiditis.Since both Vitamin D and thyroid hormones act via steroid receptors; so any alteration in the level of Vitamin D is possible to increase problems related with hypothyroidism.Vitamin D mediates its achievement through binding to vitamin D receptor (VDR) and commencement of VDR responsive genes. VDR gene polymorphism was established to associate with autoimmune thyroid diseases. There are about 42 million people in India who suffer from thyroid disorders. Hypothyroidism is predictable to be prevalent in 11% of the Indian population, with 9% being subclinical hypothyroid.Elderly people as well as children and young adults are potentially at high risk for vitamin D deficiency. Prominently, both vitamin D and thyroid hormone bind to similar receptors called steroid hormone receptors. A different gene in the Vitamin D receptor was shown to predispose people to autoimmune thyroid disease including Graves' disease and Hashimoto's thyroiditis. Serum 25(OH)D3, the most abundant circulating precursor of active Vitamin D, is the most reliable and widely accepted indicator of Vitamin D status. Vitamin D deficiency is defined as a 25(OH)D3 below20 ng/ml and Vitamin D insufficiency as 25(OH)D3of 21–29 ng/ml. Levels of 25(OH)D3 >30 ng/ml are considered to be optimal.The association studies between Vitamin D insufficiency and primary hypothyroidism have given mixed results. The high prevalence of hypothyroidism and Vitamin D insufficiency in the Indian population provided us a unique opportunity to assess the association between these two variables.

METHODOLOGY

The reason of this trial was to examine the association among hypothyroidism and vitamin D deficiency. This is a cross–sectional study Institutional Ethics Committee approval and written conversant consent was taken from patient participating in the study. Patient came to Rama Medical College and Hospital from September 2018 till March 2019 was enrolled in the study

Inclusion criteria:

Adults aged more than 18 year of both the sexes diagnosed with primary hypothyroidism were enrolled for this study.

Exclusion criteria:

Patients with post radioiodine hypothyroidism, hepatic or renal dysfunction, on anti- epileptic medications or vitamin D supplementation were excluded from the study. Age- and sex-matched euthyroid controls were chosen from the Department of Medicine.

A detailed history and clinical examination were performed to identify the signs and symptoms related to hypothyroidism and vitamin D deficiency. Thyroid-stimulating hormone (TSH), free T4 (fT4), Free T4, and 25 hydroxy Vitamin D levels were assayed for each patient in the primary hypothyroidism group. Vitamin D levels were assayed for the control group with normal TSH.

Sample size and statistical analysis:

The mean standard deviation (SD) and the range were calculated for all continuous variables. Student's t-test was used to compare the means of TSH, Vitamin D levels between the different groups (hypothyroid and euthyroid). Chi-square test was used to compare the prevalence of severe VDD among theTPO-Ab positive and negative groups. Statistical analysis was performed using the software SPSS for Windows version 18.0. The value of $P < 0.05$ was considered statistically significant.

RESULT

At the study baseline, we engaged 230 members; though, 30 patients were excluded from the study because of not fulfilling the inclusion criteria. In the current study,200 patients(n = 100) and placebo (n = 100)] finalized the trials. On average, the rate of amenableness in theOur study was high, such that 100% of capsules were taken throughout the study in both groups. No side effects were informed after the consumption of vitamin D supplements in participants during the study.

Table 1: General characteristics of study participants

	Placebo group (n=100)	Vitamin D group (n=100)	*P*
Age	36.8±19.1	35.9±11.0	0.40
Height (cm)	166.7±2.8	168.3±4.2	0.30
Weight at study baseline (kg)	73.0±19.7	76.2±11.9	0.50
Weight at end of trial (kg)	76.1±12.7	74.3±11.8	0.53
BMI at study baseline (kg/m2)	28.0±5.2	30.3±4.9	0.62
BMI at end of trial(kg/m2)	27.1±4.2	30.4±4.8	0.65

In the general characteristics of study participants there is no significant difference in the Age of the placebo group and vitamin D group. The age of placebo and vitamin D group have P value of 0.40. The height of the placebo group participant and vitamin D group participant is almost similar.BMI of both the groups remain almost unchanged before and after the trial as seen by P values in table 1

Table 2: Vitamin D levels amongst patients

Vitamin D	Frequency	Percentage
Deficiency (<20ng/ml)	118	59
Insufficiency(20- 30ng/ml)	42	21
Sufficiency(>30ng/ml)	40	20

In table 2 vitamin D level among patients is shown .in our study 59% patients have deficiency of vitamin D 21% patients shows insufficient in vitamin D .20%patients had sufficient level of vitamin D .

Table-3: Comparison between vit D levels and Thyroid Disorders

Parameters	Euthyroid (TSH=.25-5) (n=160)	Subclinical hypothyroid (TSH >5-7) (n=24)	Overt hypothyroid (TSH >7) (16)
Vitamin D (ng/mL)	30.12±18.04	16.73±10.67	15.11±11.48
TSH (uIU/mL)	2.56±1.30	6.95±0.57	18.24±16.32
T3 (nmol/L)	2.94±34.18	1.61±0.75	0.86±0.89
T4(nmol/L) 98.19±26.01 64.48±24.9150.62±24.68			

In our study there were 160 cases of euthyroid in which the TSH levels were between 0.25-5 U/U/ml. There were 24 cases of subclinical hypothyroid and 16 cases of overt hypothyroidism. The mean levels of Vitamin D in subclinical and overt hypothyroidism were 16.73±10.67 and 15.11±11.48 ng/ml respectively. There was a major disparity in the level of Vitamin D in all the cases. The mean TSH level in this study euthyroid cases was2.56±1.30 uIU/ml. our finding shows the mean TSH levels in subclinical and over hypothyroidism were 6.95±0.57 and 18.24±16.32 uIU/ml correspondingly. There was imperative difference in TSH levels amid the three graphs (P<0.05) (Table 3).

DISCUSSION

Vitamin D play role in bone and mineral homeostasis, and it has been shown recently that its deficiency is linked with a variety of diseases such as cardiovascular disease, cancer, infection, and adiposity as well as osteoporosis. The best indicator of vitamin D status is Serum concentration of 25(OH)D. many studies have been conducted in order to find any important alliance between the levels of vitamin D and hypothyroidism and to decide whether vitamin D deficiency involves in the pathogenesis of hypothyroidism or somewhat a consequence of the disease and those that yielded at odds results. There are 7-95% females and 1-2% males across the world that has variable thyroid conditions. In our current study Vitamin D deficiency was seen in 59% of the subjects irrespective of the thyroid status. Our study findings were in agreement with the study conducted by Giovannuci et al to determine the Vitamin D status amongst men and Gross MD et al20 to find the function of prevention of prostate cancer. Study conducted by Nirensiongh et al in North Indian population of Meerut, there were 53.94% were found to be Vitamin D deficient. Byron Richards studied the effect of vit D deficiency on thyroid gland in he reported that a lack of vitamin D contributed to the possibility of low thyroid hormones. On the, other study conducted in Netherlands showed that Vitamin D deficiency is not associated with early stages of thyroid autoimmunity.

CONCLUSION

Overall, the current study demonstrated that vitamin D have quite important relation with the hypothyroidism. Our study shows the prevalence of Vitamin D deficiency is higher in hypothyroid patients when compared to the normal population in present study deficiency of Vitamin D associate with raise in levels of TSH. Consequently there should be usual screening of hypothyroid patients for deficiency of Vitamin D.

REFERENCES

1. Makariou S, Liberopoulos EN, Elisaf M, Challa A, 2011 Novel roles of vitamin D in disease: What is new in 2011? Eur J Intern Med 22:355-362.
2. Marwaha RK, Sripathy G. Vitamin D and bone mineral density of healthy school children in northern India. Indian J Med Res 2008;127:239-44.
3. Scragg R, Sowers M, Bell C. Serum 25 hydroxyvitamin D, diabetes and ethnicity in the Third National Health and Nutrition Examination Survey. Diabetes Care 2004;27:2813-8.
4. Pittas AG, Lau J, Hu FB et al. The role of vitamin D and calcium in type 2 diabetes: a systematic review and meta analysis. J ClinEndocrinolMetab 2007;92:2017- 29.
5. Carbone LD, Rosenberg EW, Tolley EA et al. 25 hydroxyvitamin D, cholesterol and ultraviolet irradiation. Metabolism 2008;57:741-8
6. Chopra S, Cherian D, Jacob JJ. The thyroid hormone, parathyroid hormone and vitamin D associated hypertension. Indian J EndocrinolMetab 2011;15:S354- 60.
7. Bagcchi S. Hypothyroidism in India: More to be done. Lancet Diabetes Endocrinol 2014;2:778.
8. Holick MF, Chen TC. Vitamin D deficiency: A worldwide problem with health consequences. Am J ClinNutr 2008;87:1080S-6S.
9. Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP, et al. Evaluation, treatment, and prevention of Vitamin D deficiency: An Endocrine Society clinical practice guideline. J ClinEndocrinolMetab
10. 2011;96:1911-30.
11. GR, Gupta A. Vitamin D deficiency in India: Prevalence, causalities and interventions. Nutrients 2014;6:729-75
12. Vilarrasa N, Vendrell J, Maravall J, Eli0o I, Solano E and San Jose E. Is plasma 25(OH) D related to adipokines, inflammatory cytokines and insulin resistance in both a healthy and morbidly obese population? Endocrine. 2010; 38(2):235–42.
13. Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Calcium and Vitamin D. Washington, DC: National Academy Press. 2010.
14. Canaris GJ, Manowitz NR, Mayor G, Ridgway EC. The Colorado thyroid disease prevalence study. Arch Intern Med 2000;160:526–534.
15. Giovannucci E, Liu Y, Rimm EB. Prospective study of predictors of vitamin D status and cancer incidence and mortality in men. J Natl Cancer Inst 2006;98:451-9.
16. Gross MD. Vitamin D and calcium in the prevention of prostate and colon cancer: new approaches for the identification of needs. J Nutr 2005;135:326-31
17. Koch N, Kaur J, Mittal A, Gupta A, Kaur IP, Agarwal S. Status of vitamin D levels in hypothyroid patients and its associations with TSH, T3 and T4 in north Indian population of Meerut, a cross sectional study. International Journal of Clinical Biochemistry and Research. 2016;3:295-8.
18. Byron Richards. Low Vitamin D Contributes to Thyroid Problems. Health news 2008.
19. Effraimidis G, Badenhoop K, Tijssen JG and Wiersinga WM. Vitamin D deficiency is not associated with early stages of thyroid autoimmunity.