



Evaluation of Vitamin D Level in Thyroid Disorder and its Correlation with Autoimmunity

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Introduction

Vitamin D deficiency has become a global health problem. But it is most under-diagnosed and under-treated nutritional deficiency in the world [1–3]. Vitamin D was earlier known as a regulator of calcium homeostasis, and bone formation. Now many studies has indicated non skeletal functions of vitamin D also. Deficiency of vitamin D was also found to correlate with an increased incidence of autoimmune diseases, including type I diabetes mellitus (T1DM), [4] rheumatoid arthritis[5] and systemic lupus erythematosus.[6-8] It was reported that patients with Hashimoto’s thyroiditis, an autoimmune thyroid disease had lower vitamin D levels. [9] One recent study showed that the prevalence of vitamin D deficiency is higher in patients with AITDs and that the presence of anti-thyroid antibodies is significantly more common in patients with vitamin D deficiency than in those with higher vitamin D levels.[10] In contrast, another study performed in India revealed a weak association between low vitamin D levels and AITDs. Small case-control studies have suggested lower serum vitamin D levels or a higher prevalence of vitamin D insufficiency in patients with AITD compared with healthy controls.[11–16] In more recent years, the

actions of vitamin D have been shown to go beyond calcium metabolism to include cell growth, differentiation, maturation and apoptosis, anticarcinogenic effects, and autoimmune activities .[17-18]

Aims and Objectives

- i. To evaluate association of vitamin D with thyroid disorder
- ii. To correlate the level of Vitamin D with severity of thyroid disorder
- iii. To correlate the level of Vitamin D with Anti TPO level

Material and Method

This observational study was done in department of Biochemistry, IGIMS Patna from August 2015 to August 2017. Hundred known cases (18 -75 years) of thyroid disorder (Hypothyroidism & Hyperthyroidism), attending internal medicine outdoor was taken as case and 100 normal healthy individuals of similar age and sex group was taken as control. After overnight fast 5 ml venous blood was collected in a plain vacutainer to get serum. After clotting, serum was separated and kept as aliquot in deep freezer if not analysed same day. This sample was used to estimate Vitamin D, FT4, TSH and anti TPO

antibody by chemiluminescent immunoassay analyser (ACCESS 2 Beckman Coulter). Level of vitamin D (25-OH vitamin D) was divided in different group according to the level given in Table no – 1

Table no – 1

Vitamin D Status	25 (OH) Vitamin D Concentration Range (ng/mL)
Deficient	< 20
Insufficient	20 - <30
Sufficient	30-100

Inclusion criteria

Newly diagnosed cases of thyroid disorder (Hypothyroidism & Hyperthyroidism) of 18 -75 years of age and both sex was taken as cases and normal healthy individuals of same age and sex group was taken as control.

Exclusion criteria

Patients having any other major problem like cardiac disease, diabetes, renal disease , hepatic disease etc. was excluded from the study. Patient taking vitamin D or any drug for thyroid disorder or not willing to participate in the study was also excluded.

Result

Data was analysed by Instant Graph pad software. Mean and standard deviation of different parameters are given in Table no – 2. Mean age of case and control group was 41.44 ± 12 and 43.19 ± 14.14 years respectively. There were 41 % male and 59 % female in the study group. 94 % cases of thyroid disorder were found to be of hypothyroidism and 6 % cases were of hyperthyroidism. In the thyroid disorder cases, 50 % have deficient vitamin D level, 41 % have insufficient vitamin D and 9 % have normal level of vitamin D. In the control group, 15 % have deficient, 30 % percent insufficient and 54% have normal vitamin D level. All the parameters of hypothyroid cases were significantly different from the control group.

Level of serum fT4 and vitamin D were significantly lower in hypothyroid cases than control group. Serum TSH and anti TPO level were significantly higher in hypothyroid group than control group. In hypothyroid group, positive correlation($r = 0.243$) was found between fT4 and Vitamin D and it was significant (p value is 0.01). Negative correlation($r = - 0.142$) between TSH and Vitamin D was found and it was significant (p value is 0.01). Anti TPO and Vitamin D was found negatively correlated($r = -0.363$) and it was also significant (p value is 0.0002). Positive ($r =0.182$) but non- significant correlation (p value is 0.584) was found between Anti TPO and TSH of hypothyroid patients.

Table no – 2

Mean ± SD	Case	Control
Age	41.44 ± 12 Years	43.19± 14.14 Years
fT4	0.73±0.49 ng/dl	1.59± 0.78 ng/dl
TSH	54.32 ± 36.63 uIU/ml	3.31 ± 1.55 uIU/ml
Anti TPO	275.37 ± 190.80 IU/ml	4.70 ± 2.15 IU/ml
Vitamin D	20.45 ± 8.98 ng/ml	29.52 ± 8.83 ng/ml

Discussion

Active form of vitamin D exerts its effect through nuclear vitamin D receptor (VDR), which acts on vitamin D response element (VDRE) of target genes to exert its effects.[19] VDR is found in many cells including B cells, T cells, monocytes and macrophages.[20] Active form of vitamin D decreases the proliferation of Th1 cells and production of interleukin 2, interferon gamma and tumour necrosis factor[21,22,23] and increases production of interleukin 4 and 5 by Th2 cells .[24] Vitamin D also decreases production of IL-17 by Th17 cells.[25] Thus Vitamin D is found to have association with immune

system. Factors which affect this association, can shift the balance between Th1 and Th2 cells resulting in different autoimmune diseases. Vitamin D also promotes dendritic cell apoptosis and prevents its differentiation and maturation leading to decreased antigen presentation and T cell activation. Autoimmune thyroid disorders are common organ specific diseases which include both hypothyroidism and hyperthyroidism. Many studies has been done in different areas to find out vitamin D level in different group of cases, but in my knowledge this type of study has not be done in our state.

In our study, we found the level of vitamin D is significantly higher in normal healthy group than cases of thyroid disorders. This is similar to the study done by A.D Unal, et al.[26] In this study, level of vitamin D was found deficient in 50 %, insufficient in 41 % and sufficient in only 9 % of cases of thyroid disorder. In hyperthyroid cases also level of vitamin D was not sufficient. In the control group, vitamin D level was found as sufficient in 54 %, insufficient in 31 % and deficient in 15 % individuals. It is in consistence to a meta- analysis [27] which found that vitamin D level is lower in case of autoimmune thyroid disorder than normal healthy individuals.

Conclusion

In our study significant negative association of vitamin D level was found with thyroid disorder. 91% cases of thyroid disorder were found to have either deficient or insufficient vitamin D level. Significant negative correlation was found between anti TPO and vitamin D level in hypothyroid cases. It indicates that vitamin D level should be estimated in all cases of thyroid disorder. And effect of vitamin D supplementation on improvement of thyroid disorder should be evaluated on a large population.

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