



## ORIGINAL RESEARCH ARTICLE

## PREVALENCE OF VITAMIN D DEFICIENCY IN PATIENTS ATTENDING OUTPATIENT CLINIC WITH THYROID DISORDERS IN CHITWAN MEDICAL COLLEGE TEACHING HOSPITAL

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### ABSTRACT

**Objectives:** Vitamin D deficiency is being studied all over the world and is a global health problem. Recent studies have shown that Vitamin D may have a significant role in reducing the incidence of autoimmune diseases. This study was conducted to find out the level of Vitamin D in patients with thyroid disorders and compare Vitamin D levels in AntiTpo positive and negative patients. **Subject and Methodology:** 60 patients from Chitwan Medical College outpatient clinic were included in the study from February to May 2016. A brief history and clinical examinations were taken from all patients along with laboratory tests for thyroid functions, TPO antibody level, 25(OH) Vitamin D3 level and Serum Calcium level. **Results:** Both patients of hypothyroidism (autoimmune and nonautoimmune) had severe Vitamin D deficiency. Most of the hyperthyroid cases had Vitamin D insufficiency. Anti TPO positive and negative patients both had Vitamin D deficiency. **Conclusion:** Our study shows there is significant Vitamin D deficiency in hypothyroidism and hyperthyroidism irrespective of its autoimmunity. This study certainly encourages us to screen Vitamin D and supplement Vitamin D to all thyroid disorders patients.

**Key words:** Anti TPO Antibodies, Hyperthyroidism, Hypothyroidism, Vitamin D.

### INTRODUCTION

Vitamin D is an immunomodulating lipid soluble prohormone having a widespread effect on proliferation, differentiation, apoptosis and angiogenesis of cells. Their receptors belong to steroid/thyroid receptors which reside on various cells such as monocytes, macrophages and lymphocytes. By activating these VDR receptors Vitamin D suppresses certain cytokines such as CD4+, TH1, TH2 and TH17 thus inhibiting inflammatory conditions in the body.<sup>2</sup> Various studies and researches on Vitamin D have shown that it not only have effect on regulation of calcium and bone formaton but its deficiency may equally have effect on autoimmune diseases such as type 1 Diabetes, Multiple Sclerosis, SLE, Inflammatory Bowel Diseases, Autoimmune thyroid disorders and cancers.<sup>1,5</sup> More than 1 billion people worldwide has been estimated to have Vitamin D deficiency

(serum 25 – hydroxyvitamin D3{25(OH)D3}).

Vitamin d deficiency has been classified to be severe (below 10 ng/ml), deficiency (10-19 ng/ml), insufficiency (20-29 ng/ml) and above 30 ng/ml as normal.<sup>6</sup>

Hashimoto's thyroiditis (chronic autoimmune thyroiditis) and Grave's disease are the leading cause of autoimmune thyroid disorders in the world. Hashimoto's thyroiditis is usually hypothyroid and arises due to complex reaction between environment and genetic factors and is confirmed by detection of antibodies in serum (antithyroglobulin, thyroid peroxidase and TSH receptor antibodies).<sup>3</sup> Graves disease is a severe form of hyperthyroidism having a life threatening effect on heart -atrial fibrillation, ventricular tachycardia and cardiac

arrest. This disease is diagnosed with raised titer of anti TPO antibodies and thyroid stimulating immunoglobulins.<sup>4</sup>

Plethora of researches on Vitamin D deficiency and its relation with autoimmune thyroid disorders are going on in recent years and the results are conflicting. Some studies have stressed observing high prevalence of auto-immune thyroid disease (AITD) in Vitamin D deficient people whereas a study in India showed a weak relation between Vitamin D deficiency and autoimmune thyroid disorders.<sup>7</sup> As there are various dilemma on this subject, we tried to evaluate the relationship between Vitamin D and autoimmune thyroid disorders.

## MATERIAL AND METHODS

The study was conducted in Chitwan Medical College (CMC), Bharatpur from February to May 2016. Ethical clearance was obtained from CMC ethical board in 2015. All the patients who were diagnosed with thyroid disorders based on signs and symptoms or picked on routine screening at this hospital during that period were included in the study. A total of 60 patients from Chitwan district and outskirts were studied. Written consent were obtained from all patients included in this study.

Detailed history and clinical examinations were done to look for the signs and symptoms of thyroid disorders. Those having signs/symptoms were evaluated with thyroid function tests (TFT). TSH >5.0 U/ml and <0.35 U/ml were taken as suggestive of thyroid disorder-hypothyroidism and hyperthyroidism respectively. Then these patients with abnormal TFTs were evaluated for anti TPO, Vitamin D and serum calcium levels by Chemiluminescence assay (CLIA). The reports thus obtained were analysed. Subjects were compared for the differences in Vitamin D levels according to the thyroid function tests as well as the antibody titres.

Exclusion criteria were age less than 15 and older than 80, on drugs such as vitamin D, steroid, calcium, contraceptive pills, anti-tubercular therapy and antiepileptics.

## RESULTS:

Total of 60 patents were enrolled in our study which included 11 males and 49 females. The mean age of patents was  $41.55 \pm$  years. Of the total thyroid disorder, 81.3% were hypothyroid and only 18.7% were hyperthyroid. According to the sex distribution; out of eleven male patients, two were tpo positive and both had vitamin D deficiency. There were 23 tpo positive female patients and 21 of them were vitamin D deficient.

Approximately 18% of the male patients had autoimmune thyroid disorder while the incidence of autoimmune thyroid diseases in females was much higher i.e. 47%. But in both sex with tpo positivity the deficiency of Vitamin D was not significantly different i.e. 100% in male and 91.3% in females.

Similarly 41.67% were anti TPO positive and 58.33% were anti TPO negative. Ninety percent of the patents with thyroid disease were found to have Vitamin D deficiency which shows strong association between Vitamin D deficiency and thyroid disease.

However this study does not show significant association between anti TPO and Vitamin D deficiency as in both TPO positive and negative cases the incidence of Vitamin D deficiency was almost similar i.e. 92% and 88.5% respectively.

Among hypothyroid patients, 40.81% (20/49) were anti tpo positive (autoimmune thyroiditis), , 59.18% (29/49) were anti tpo negative.

Out of the total hypothyroid patients, 89.79% had Vitamin D deficiency and only 10.20% had normal Vitamin D level. More than 50% patients with hypothyroidism were found to have severe Vitamin D deficiency. Similar results were obtained in hyperthyroid group. 45.45% (5/11) were anti tpo positive hyperthyroidism and 54.54%(6/11) were anti tpo negative hyperthyroidisms. 90% of hyperthyroid cases had Vitamin D deficiency with 9.09% without Vitamin D deficiency.

However, the severity of Vitamin D deficiency was much less in this group. only 9.09% (5/11) had severe deficiency, and 36.3%(4/11) had insufficiency.

**Table 1. Thyroid autoantibody level in hypothyroidism and hyperthyroidism**

Thyroid disease	Ant tpo antibody	
	Positive	Negative
Hypothyroidism	40.81%	59.18%
Hyperthyroidism	45.51%	54.54%
Total	41.67%	58.3%

**Table 2. Severity of vitamin d deficiency in hypo and hyperthyroidism**

	Severity			
	Normal	Insufficiency	Deficiency	Severe deficiency
Hypothyroidism	10.2%	14.2%	20.4%	55.1%
Hyperthyroidism	0%	36.3%	18.18%	9.09%
Total	8.3%	18.3%	20%	53.3%

**Table 3. Severity of vitamin d level in anti tpo positive and negative thyroid individuals**

	Severity			
	Normal	Insufficiency	Deficiency	Severe deficiency
Ant tpo +ve	4%	24%	24%	42%
Ant tpo -ve	11.4%	14.28%	17.14%	57.14%

**Table 4. Correlations between vitamin d deficiency, autoimmunity and sex**

Vitamin D deficiency	Sex	Anti tpo positive	Anti tpo negative	Total
Yes	Male	2	9	11
	Female	21	22	43
	Total	23	31	54
No	Female	2	4	6
	Total	2	4	6

## DISCUSSIONS

Among the endocrine abnormalities thyroid disorders are one of the most common disease encountered worldwide. Furthermore autoimmune thyroid disorder such as Hashimoto's thyroiditis and Graves' disease accounts for 5% of population and are linked with severe Vitamin D deficiency.<sup>8</sup> Vitamin D may have combined genetic, environmental, immune and hormonal influence on autoimmune thyroid disorders.

Halder et al had described that autoimmune thyroid disease patients had significantly low serum Vitamin D

levels.<sup>7</sup> Bozkurt et al also revealed that lower Vitamin D level had inverse correlation with antibody levels.<sup>1</sup> Similar to the study conducted by Boyuk et al our study also does not show any association between anti tpo and Vitamin D deficiency as in both tpo positive and negative cases the incidence of Vitamin D deficiency was almost similar i.e. 92% and 88.5% respectively.<sup>9</sup>

Kivity et al explained that there was no association between between hyperthyroidism and Vitamin D deficiency as compared to hypothyroidism.<sup>8</sup> However Jyotsna et al found that there is Vitamin D deficiency in hyperthyroid patients leading to decreased bone mass which is consistent with the result of my study .<sup>10</sup>

## CONCLUSION

Our study shows a strong relationship between thyroid disorders and Vitamin D deficiency as both hyper and hypothyroid disorders showed significant Vitamin D deficiency. However this study showed no association between anti tpo and Vitamin D deficiency.

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