



## THE CORRELATIVE STUDY OF VITAMIN D AND THYROID BOTH IN MALES AND FEMALES AMONG THE NORTH INDIAN POPULATION OF DIFFERENT AGE GROUPS

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### ABSTRACT

**Background:** The main function of thyroid hormone is to maintain the metabolic homeostasis, muscle metabolism and bone growth whereas the vitamin D helps in synthesis of calcium in body for the formation of bones and mineral metabolism. This study aims to find correlation between Vitamin D and Thyroid hormones in different age group population. **Methods:** This was a cohort study comprising 100 samples from different patients conducted at Pathcare labs, Gurgaon Haryana, from Dec 2018 – June 2019. Data collection was carried out through the medical records of outpatients. **Result:** The patients with high levels of vitamin D had lower levels of thyroid hormone. Whereas in thyroid hormones, females had low levels than males. **Conclusions:** There is no significant correlation between Vit D and Thyroid hormone in the studied groups. However, it was noted that thyroid hormones levels were lower compared with males.

**KEYWORDS:** TSH, TRH, VIT D2, VIT D3.

### INTRODUCTION

Thyroid diseases are common worldwide. In India too, there is a significant burden of thyroid diseases. According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases. Five common thyroid diseases in India: (1) hypothyroidism, (2) hyperthyroidism, (3) goiter and iodine deficiency disorders, (4) Hashimoto's thyroiditis, and (5) thyroid cancer. Hashimoto's Thyroiditis:- also known as autoimmune thyroiditis. The decreased iodine uptake and utilization further causes swelling in the thyroid gland and causes goiter. This disease is more likely to occur in people with certain chromosomal abnormalities, including Turner's, Down syndrome.<sup>[1-2]</sup>

Acute and Subacute Thyroiditis:- Acute Thyroiditis is a rare disorder caused by bacterial infection in thyroid gland and Subacute Thyroiditis is a non-bacterial disease caused by viral infection. In case of the prior changing of the structure of the gland within 2-4 months then corticosteroid hormone injection is given.<sup>[3-4]</sup> Iodine Deficiency, Thyroid Enzyme Defects, Thyroid hypoplasia and Goitrogens: Causes hypothyroidism as the synthesis and release of thyroid hormone is

decreased. It affects mostly the developing fetus and causes cretinism. Congenital Hypothyroidism:- occurs in infants due to absence of thyroid tissue or hereditary defect in thyroid hormone biosynthesis. This affects mostly the female infants compared to male infants. This further does not allow the bone growth, poor myelination and poor skeletal growth.<sup>[5]</sup>

### VITAMIN D

Vitamin D deficiency is likely to play an important role in the very high prevalence of rickets, osteoporosis, cardiovascular diseases, diabetes, cancer and infections such as tuberculosis in India. Vitamin D is one of a kind since it tends to be made in the skin from presentation to sunlight. However, 25(OH)D requires a further hydroxylation in the kidneys by the 25(OH)D-1-OHase (CYP27B1) to shape the organically dynamic type of vitamin D 1,25(OH)2D.<sup>[10,11]</sup> 1,25(OH)2D invigorates intestinal calcium absorption. Without vitamin D, just 10– 15% of dietary calcium and about 60% of phosphorus are ingested. Vitamin D adequacy improves calcium and phosphorus ingestion by 30– 40% and 80%, respectively.<sup>[6]</sup> The thyroid hormone status would play a role in the maintenance of vitamin D sufficiency, and its immunomodulatory role would influence the presence of

autoimmune thyroid disease. The positive correlation between free T4 and vitamin D concentrations suggests that adequate levothyroxine replacement would be an essential factor in maintaining vitamin D at sufficient levels. Suppressed TSH was associated with higher Vit D levels, the association was not linear between TSH and VitD in postmenopausal women.<sup>[7]</sup>

A study demonstrated that vitamin D supplementation among hypothyroid patients for 12 weeks improved serum TSH and calcium concentrations compared with the placebo, but it did not alter serum T3, T4, ALP, PTH, and albumin levels.<sup>[8]</sup> Although observational studies support a beneficial role of vitamin D in the management of thyroid disease, randomized controlled trials are required to provide insight into the efficacy and safety of vitamin D as a therapeutic tool for this dysfunction.<sup>[9]</sup>

Based on those backgrounds, this study aimed to determine the correlations between vitamin D and thyroid status in general population in northern India comprising different age groups.

## MATERIALS AND METHODS

This study was conducted with 100 cases of various age groups who visited a private lab in Gurgaon from Dec 2018 – June 2019. The patients are of both the genders (Male and Female). The collected data is categorized into different age groups, less than 10 yrs, 10-30yrs, 30-50yrs, 50-70yrs and 70 years and above.

Inclusion criteria: Patients who have 5 years or above age and less than 80 years of age.

Exclusion criteria: Patients with known other disease and aged below 5 years and above 80 years. The levels of each patient were analyzed by using Microsoft Office Excel 2019 to know whether it was lower or normal or higher by comparison to the reference ranges and also to find the correlations among them.

## RESULTS

Total number of patients participating in the study were 100 people 37 males and 63 females of which they were segregated age wise. The female population are more affected. Noted results revealed that there is no significant correlation found between vitamin D and thyroid disease, but instead other correlations were found like liver function test and kidney function test, the values of some were low and high in different patients.

**Table no. 1.3: Female patients affected and non-affected comparison.**

| Age group | Thyroid hormone low levels in patients | Thyroid hormone normal |
|-----------|----------------------------------------|------------------------|
| <10       | 0                                      | 1                      |
| 10-30     | 4                                      | 25                     |
| 30-50     | 10                                     | 14                     |
| 50-70     | 5                                      | 4                      |
| >70       | 0                                      | 0                      |

**Table no.1.4:- Female patients affected and non-affected by vitamin D.**

| Age groups | Vitamin D Low levels patients | Vitamin D normal population |
|------------|-------------------------------|-----------------------------|
| <10        | 0                             | 0                           |
| 10-30      | 31                            | 8                           |
| 30-50      | 5                             | 3                           |
| 50-70      | 9                             | 6                           |
| >70        | 0                             | 1                           |

**Table no.1.6: Total number of Male patients affected by both thyroid and Vitamin D.**

| Age groups | Thyroid hormone low levels patients | Vitamin D low level patients |
|------------|-------------------------------------|------------------------------|
| <10        | 0                                   | 0                            |
| 10-30      | 3                                   | 3                            |
| 30-50      | 8                                   | 7                            |
| 50-70      | 0                                   | 8                            |
| >70        | 0                                   | 0                            |

## DISCUSSION

The most frequent forms found in it are vitamin D3 (cholecalciferol) and vitamin D2 (ergocalciferol). Vitamin D deficiency has been related to an increased risk of diabetes, viral infections, atherosclerosis, and autoimmune diseases including thyroiditis.<sup>10-11</sup> Over the past few decades, the importance of vitamin D in non-skeletal actions has been studied, including the role of vitamin D in autoimmune diseases, metabolic syndromes, cardiovascular disease, cancers, and all-cause mortality. Recent evidence has demonstrated an association between low vitamin D status and autoimmune thyroid diseases such as Hashimoto's thyroiditis and Graves' disease, and impaired vitamin D signaling has been reported in thyroid cancers.<sup>[12]</sup>

A study conducted by mackawy et al, indicated that patients with hypothyroidism suffered from hypovitaminosis D with hypocalcaemia that is significantly associated with the degree and severity of the hypothyroidism. That encourages the advisability of vit D supplementation and recommends the screening for Vitamin D deficiency and serum calcium levels for all hypothyroid patients.<sup>13</sup> Approximately 1 in 8 women will be affected by a thyroid condition at some point in their lives. The risk for women is about 10 times higher than for men. One reason for this is that thyroid disorders are often triggered by autoimmune responses, which happen when the body's immune system starts to attack its own cells.

In our present study, comprising 100 patients in which more of them were females (63) than 37 males and other age groups but specially 30-50 age groups are affected mildly. 11 males are having low thyroid hormones and 18 males are having low vitamin D. 19 females are having low thyroid hormones and 45 females with low vitamin D. 14 females are having low levels of both vitamin D and Hypothyroidism whereas 10 males are having low vitamin D and hypothyroidism. None of them

have symptoms of either hypovitaminosis D, or hypothyroidism. Females are having more imbalance by thyroid hormones than males, especially between the ages of 30. It is obvious that patients with high levels of vitamin D had lower levels of thyroid hormone. All these comparisons, however, do not prove correlation between Vitamin D and Thyroid hormone in any age or sex group.

## CONCLUSION

In conclusion, the clinical findings with labs results revealed no significant correlation between vitamin D and thyroid diseases. Females are more impacted by thyroid hormones than males, especially between the ages of 30 and 50. It is obvious that patients with high levels of vitamin D had lower levels of thyroid hormone. Our study suggests to screen for vitamin D and thyroid tests periodically to avoid long term complications.

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