**Vitamin D Deficiency and its Association with Thyroid Diseases**

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**ABSTRACT**

**Introduction:** The primary action of Vitamin D is regulation of calcium and phosphorus homeostasis. Recent studies have shown that Vitamin D deficiency is associated with increased risk of diabetes Mellitus, infectious diseases, atherosclerosis and autoimmune condition like autoimmune thyroiditis. There has been no clear research to show the association between hypothyroidism and Vitamin deficiency. The present study was conducted with the prime aim to establish association between thyroid disorder and Vitamin D deficiency.

**Material and methods:** The present study was conducted in the Department, institute, State. The study was conducted for a duration of two years (June, 2016- June, 2017). This cross sectional study enrolled 90 subjects. Under complete aspetic conditions venous blood was withdrawn from antecubital vein. Levels of T3, T4 and TSH were estimated using fluorescence array. To determine the levels of Vitamin D, 25(OH)D was calculated. All the data was arranged in a tabulated form and analyzed using SPSS software. Independent T Test was used for comparison.

**Results:** It was observed that out of 90 subjects, there were 58.8% patients (n=53) who had Vitamin D deficiency i.e. the Vitamin levels were less than 20 ng/ml. There were 73 cases of euthyroid in which the TSH levels were between 0.25-5 U/U/ml. There were 10 cases of subclinical hypothyroid and 7 cases of overt hypothyroidism. The mean levels of Vitamin D in subclinical and overt hypothyroidism were 16.23+/-.10.47 and 13.11+/-.10.48 ng/ml respectively. There was a significant difference in the level of Vitamin D in all the cases.

**Conclusion:** In present study deficiency of Vitamin D correlates with increase in levels of TSH. There is progressive decrease in level of Vitamin D from subclinical to overt hypothyroidism.

**Keywords:** Hypothyroid, Subclinical, Vitamin

**INTRODUCTION**

Vitamin D is a steroid that is produced by skin and it aids in the regulation of expression of various genes.¹ The primary action of Vitamin D is regulation of calcium and phosphorus homeostasis. Recent studies have shown that Vitamin D deficiency is associated with increased risk of diabetes Mellitus²-⁵, infectious diseases⁶, atherosclerosis⁷ and autoimmune condition like autoimmune thyroiditis.⁸⁻¹⁰ Decrease in the levels of Vitamin D are majorly due to decreased exposure to sun, obesity and decrease in physical activity. There are increasing reports in literature regarding association between deficiency of Vitamin D and diseases outside the skeletal system. Activity of Vitamin D is mediated through vitamin D receptors which further leads to activation of various genes.⁸ Vitamin D receptors are present in different body tissues like myocardium, pancreas, and thyroid gland etc.⁹ Studies conducted in animals have shown that supplementation with Vitamin D reduces the severity of symptoms and leads to decrease in the TH1 action in autoimmune arthritis and it also prevented diabetes and pancreatic lesions in mice models.¹⁰ Since both Vitamin D and thyroid hormones act via steroid receptors; so any alteration in the level of Vitamin D is likely to increase problems associated with hypothyroidism.¹¹⁻¹³ There are approximately 42 million people in India who suffer from thyroid disorders. There has not been any clear research to show the association between hypothyroidism and Vitamin deficiency. The present study was conducted with the prime aim to establish association between thyroid disorder and Vitamin D deficiency.

**MATERIAL AND METHODS**

The present study was conducted in the Department of Pediatrics, RMC, Loni. The study was conducted for a duration of two years (June, 2016 - June 2017). This cross sectional study enrolled 90 subjects. Ethical committee clearance was obtained from the Institute’s ethical board and all the subjects were informed about the study and a written consent was obtained from all. All the clinically detected cases of hypothyroidism between the age group of 5-12 years were included in the study. Any case of hyperthyroidism patients receiving Calcium or Vitamin D supplements were excluded from the study.

Under complete aspetic conditions venous blood was withdrawn from antecubital vein. Levels of T3, T4 and TSH were estimated using fluorescence array. To determine the levels of Vitamin D, 25(OH)D was calculated. Patients with TSH levels between 0.25-5 uIU/ml were categorized as euthyroid and with levels greater than 7uIU/ml were taken as overt hypothyroids. Vitamin D deficiency was considered if Vitamin D levels were less than 30 ng/ml and if the levels were between 20-30 ng/ml, it was regarded as insufficient.

**STATISTICAL ANALYSIS**

All the data was arranged in a tabulated form and analyzed using SPSS software. Independent t test was used for comparison.

**RESULTS**

It was observed that out of 90 subjects, there were 58.8% patients (n=53) who had Vitamin D deficiency i.e. the Vitamin levels were less than 20 ng/ml. There were 21.1% patients (n=19) who had insufficiency of Vitamin D i.e. levels were between 20-30 ng/ml. Only 20% subjects have sufficient levels of Vitamin D (Table 1). There were 73 cases of euthyroid in which the TSH levels were between 0.25-5 U/U/ml. There were 10 cases of subclinical hypothyroid and 7 cases of overt hypothyroidism. The mean levels of Vitamin D in subclinical and overt hypothyroidism were 16.23+/-.10.47 and 13.11+/-.10.48 ng/ml respectively. There was a significant difference in the level of Vitamin D in all the cases. The mean TSH level in euthyroid cases was 2.46+/-.1.10 uIU/ml. The mean TSH

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levels in subclinical and overt hypothyroidism were 6.45±0.67 and 17.24±15.32 uIU/ml respectively. There was significant difference in TSH levels amongst the three graphs (P<0.05) (Table 2).

**DISCUSSION**

Thyroid diseases are the most prevalent in endocrine disorders. Iodine deficiency and fluorosis are two most common endemics in India. Fluoride being more electronegative than iodine, replaces iodine from its binding sites on thyroid leading to thyroid derangements. There are 7-95% females and 1-2% males across the world that has variable thyroid conditions. In previous decades, Vitamin D deficiency was considered virtually nonexistent in the Indian population as India lies in the tropical area. But now a days various studies have revealed that 50%-90% of the Indian population is deficient in Vitamin D due to inadequate dietary intake of Calcium. In our present study Vitamin D deficiency was seen in 59% of the subjects irrespective of the thyroid status. These findings were in accordance with the study conducted by Giovannucci et al to determine the Vitamin D status amongst men and Gross MD et al to find the role of Vitamin D in prevention of prostate and colon cancer. In a study conducted by Nirensiongh et al in North Indian population of Meerut, there were 53.94% subjects who were Vitamin D deficient. In our study there were 73 cases of Euthyroid. Subclinical hypothyroidism was seen in 10 cases and overt hypothyroidism was seen in 7 subjects. There was a significant decrease in the levels of Vitamin D amongst hypothyroid patients. In a study conducted by Shilpa et al there were 56% of the hypothyroid subjects in whom Vitamin D levels were below 20 ng/ml. There were only 10% subjects who had sufficient levels of Vitamin D. Deficiency of Vitamin D can lead to Grave’s disease and various other autoimmune thyroid disorders. Variation in the VDR gene are thought due to mediate susceptibility to various endocrinal autoimmune diseases. Another reason for decrease in level of vitamin D is increased in bone turnover in hyperthyroid patients. In the secretion of parathyroid hormone and Vitamin D synthesis. Vitamin D is increased in bone turnover in hyperthyroid patients. Therefore there should be regular screening of hypothyroid patients for deficiency of Vitamin D.

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