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# STUDY OF VITAMIN D3 DEFICIENCY IN HYPOTHYROIDISM PATIENTS

Gynaecology

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## ABSTRACT

**Objectives:** This present study was to evaluate the association of various parameters like TSH levels, FT4, FT3 and anti TPO levels with the levels of vitamin D3 in hypothyroidism patients.

**Methods:** Detail history clinical examinations and relevant investigations were performed to all subjects. Sample was collected for the estimation of serum TSH, FT3, FT4, Anti-TPO and Vitamin D3 levels. Under complete aseptic conditions venous blood was withdrawn from antecubital vein. Levels of FT3, FT4, TSH, Anti-TPOAb and Vitamin D3 were estimated using fluorescence array.

**Results:** Data was analyzed by using SPSS version 26 software. One sample statistical methods analysis was used. Mean ± standard deviation were calculated. P value was taken less than or equal to 0.05 for significant differences ($p \leq 0.05$).

**Conclusions:** Hypothyroidism patients had significantly increased TSH levels. Most of the patients had decreased vitamin D3 levels. And the patients who had increased TSH levels were associated with decreased vitamin D3 levels. Hence, all the patients of hypothyroidism should be assessed for the levels of vitamin D3. And accordingly vitamin D3 supplementation should be advised for early management and treatment of vitamin D3 deficiency in hypothyroidism patients.

## KEYWORDS

Hypothyroidism, TSH, FT4, FT3, anti TPO, vitamin D3.

## INTRODUCTION

Vitamin D deficiency is a global health problem. Over a billion people worldwide have vitamin D deficiency or insufficiency [1].

Vitamin D is a steroid that is produced by skin and it aids in the regulation of expression of various genes [2]. 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 [3,4,5,6].

Vitamin D has been involved in the pathogenesis of several endocrine conditions such as type 1 diabetes, type 2 diabetes, adrenal diseases and polycystic ovary syndrome [7, 8, 9, 10]. The involvement of vitamin D in thyroid disease has been suggested by pioneering studies performed in the eighties. In particular, McDonnell et al. [11] found a strong homology between the molecular structure of vitamin D3 receptor and the receptor for thyroid hormone, which was due to two regions that they have in common: the first is a 70 amino acid, cysteine-rich sequence and the second region is a 62 amino acid one located towards the carboxyl terminus of the proteins. Low vitamin D concentrations, certain vitamin D receptor (VDR) gene polymorphisms and pathologies of vitamin D-binding proteins and of their gene may favor the development of Hashimoto's thyroiditis (HT) [12]. Women with new onset Graves' disease (GD) have a reduced 25-hydroxyvitamin D [25(OH)D] serum concentration, which also correlates with thyroid volume measured with ultrasonography [13]. Objectives of our study was to evaluate the levels of TSH, FT4, FT3, TPO ab in hypothyroidism and its association with vitamin D3 levels in patients with hypothyroidisms.

## MATERIALS & METHODS

This present study was conducted in Department of Medicine, Mata Gujri Memorial Medical College and Lions Seva Kendra Hospital, Kishanganj, Bihar during a period from July 2018 to December 2018. Attendant of entire subjects /subjects signed an informed consent approved by institutional ethical committee of Mata Gujri Memorial Medical College, Kishanganj, Bihar, India was sought.

In this present study, we were enrolled a total of 50 patients of hypothyroidism with age group 20 to 87 years. Data was collected with irrespective of sex by random sampling methods.

## PROCEDURES:

Detail history clinical examinations and relevant investigations were performed to all subjects. The patients who were known case of hypothyroidism and age ≥20 years were included in this study. And the patients were receiving any one Vitamin D3 supplement were excluded from this study.

**Laboratory findings**:

Sample was collected for serum TSH, FT3, FT4, ANTI-TPO and Vitamin D3 level estimation. Under complete aseptic conditions venous blood was withdrawn from antecubital vein. Levels of FT3, FT4, TSH, Anti-TPOAb and Vitamin D3 were estimated using fluorescence array. Patients with TSH levels greater than 10 U/mL were taken as overt hypothyroids. Subclinical hypothyroid: >5-7 U/mL and Euthyroid: 0.25-5 U/mL. Vitamin D3 deficiency was considered if Vitamin D3 levels were less than 20 g/ml and if the levels were between 20-30 g/ml, it was regarded as insufficient and sufficient if the level was more than 30 g/ml.

## STASTISTICAL ANALYSIS

Data was analyzed by using SPSS version 26 software. One sample statistical methods was used. Mean ± standard deviation (S.D) and t-value were calculated. P-value was taken equal to or less than 0.05 for significant differences ($p \leq 0.05$).

## OBSERVATIONS

In this present study, we were enrolled a total 50 patients of hypothyroidism. There were 18(36%) males and 32(64%) females.

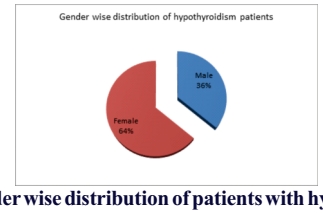


**Figure.1. Gender wise distribution of patients with hypothyroidism.**

**Table.1. various parameters of hypothyroidism patients**

| Parameters | Mean ± S.D. | t – value | p - value |
|---|---|---|---|
| Age | 43.700±13.479 | 22.925 | 000 |
| TSH (uIU/ml) | 19.240±10.558 | 12.885 | 000 |
| FT4(ng/dL) | 3.980±2.084 | 13.499 | 000 |
| FT3(ng/dL) | 4.011±3.248 | 8.731 | 000 |
| Anti TPO(IU/mL) | 5.220±2.112 | 17.476 | 000 |
| Vit D3(ng/mL) | 23.280±7.956 | 20.689 | 000 |

In this present study, mean±standard deviations of age of hypothyroid

patients were 43.700±13.479. And it was significantly differenced (p=0.000). Mean±S.D of TSH was 19.240±10.558 uIU/ml and it was significant differenced (P=0.000). Mean±S.D of FT4, FT3 and anti TPO were 3.980±2.084 ng/mL, 4.011±3.248 ng/Ml and 5.220±2.112 IU/mL respectively. All these parameters were also significantly differenced (p=0.000). Similarly, Mean±S.D of vitamin D3 was 23.280±7.956 ng/mL, it was also significant differenced (p=0.000).

**Table.2. Status of vitamin D3**

| Vitamin D3 | No. of cases | Percentage of cases |
|---|---|---|
| Sufficient | 11 | 22% |
| Insufficient | 21 | 42% |
| Deficiency | 18 | 36% |

In this present study, 11(22%) cases of hypothyroidism had sufficient vitamin D3 levels. And 39(88%) patients had decreased vitamin D3 levels. Among them 21(42%) had insufficient and 18(36%) patients had significant deficiency of vitamin D3.

## DISCUSSIONS

Thyroid diseases are the most prevalent in endocrine disorders [14]. Iodine deficiency and fluorosis are two most common endemics in India [15]. Fluoride being more electronegative than iodine, replaces iodine from its binding sites on thyroid leading to thyroid derangements. In this present study, 50 hypothyroidism patients were included. Females and males were 64% and 36% respectively. Average age of patients was 43.700±13.479 years. And it was significantly differenced (p=0.000).

Swati Sonawane**, et al. [6]** 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.

In our present study, we were found that in out of 50 cases of hypothyroidism, mean level of TSH, FT4, FT3 and anti TPO were 19.240±10.558 uIU/ml, 3.980±2.084 ng/dL, 4.011±3.248 ng/dL and 5.220±2.112 IU/mL respectively. All these parameters were also significantly differenced (p=0.000).

Vitamin D deficiency was considered virtually nonexistent In the Indian population as India lies in the tropical area [17]. 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 [18].

Several studies have reported low serum levels of vitamin D in hypothyroid patients which in turn may lead to some musculoskeletal complaints in these patients [19]. Other studies have demonstrated that the patients with Graves' disease also have low serum levels of vitamin D [20]. There are two mechanisms that may explain why serum levels of vitamin D is low in hypothyroid patients; one is that the low levels of vitamin D may be due to poor absorption of vitamin D from the intestine and the other is the body of these patients may not activate vitamin D properly [21].

In our present study, we were observed in a total 50 patients of hypothyroidism, 11 (22%) cases had sufficient vitamin D3 levels (>30 ng/mL). 21(42%) had insufficient vitamin D3 levels (20-30 ng/mL). And 18(36%) hypothyroidism patients had deficiency of vitamin D3 levels (<20g/mL). And mean level of vitamin D3 was 23.280±7.956 g/mL, and it was significantly differenced (p=0.000).

In a study by Chaudhary et al [22] was seen that administration of 60,000 IU vitamin D weekly in autoimmune thyroid disorders (AITD) had a favourable effect on autoimmunity as evidenced by significant reductions in TPO Ab titers. In addition, vitamin D3 intake after 10 weeks in diabetic rats greatly corrected the alterations in thyroid profile and D2 (deiodinase 2) expression [23].

A study from Japan including 200 patients with Graves' disease demonstrated that 40% of women and 20% of men had vitamin D deficiency [24]. Some other studies have indicated that patients with Graves' disease also have low levels of vitamin D [25] According to these findings, Afsaneh Talaei, et al. [26] showed that the prevalence of vitamin D deficiency was high in hypothyroid patients. Vitamin D supplementation significantly decreased TSH levels but had no significant effect on T4 or T3 concentrations. They found significant relationship between vitamin D deficiency and hypothyroidism.

## CONCLUSIONS

This present study concluded that the hypothyroidism patients had significantly increased TSH levels. Most of the patients had decreased vitamin D3 levels. And the patients who had increased TSH levels were associated with decreased vitamin D3 levels. Hence, all the patients of hypothyroidism should be assessed for the levels of vitamin D3. And accordingly vitamin D3 supplementation should be advised for early management and treatment of vitamin D3 deficiency in hypothyroidism patients.

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