ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 04 | April - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A CROSS SECTIONAL STUDY ON VITAMIN D3 LEVEL IN HYPOTHYROIDISM AMONG PATIENTS ATTENDING A TERTIARY HOSPITAL

Biochemistry

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ABSTRACT

Background: Vitamin D deficiency is a global health problem. Vitamin D acts through receptors in many body organs including thyroid gland. Vitamin D deficiency has been shown to be associated with many autoimmune diseases.

Materials And Methods: This cross-sectional study was conducted among 50 normal persons (control group) and 50 patients with hypothyroidism (study group) at a tertiary care centre between December 2020-February 2021. 25(OH) -D was estimated using Beckman-chemiluminescent assay and serum TSH, Free T3, serum calcium was estimated using ECLIA

Results: Serum vit D3 level was insufficient among 24 patients in study group with a mean serum 25(OH) D level of 20.11 and the p value was highly significant.

Conclusion: The study observed that hypothyroid individuals were found to have significant vitamin D3 insufficiency.

KEYWORDS

Hypothyroidism, Calcium, Vitamin D

INTRODUCTION:

Vitamin D deficiency has become a very common problem among general population, and has been linked to increase in cardiovascular diseases, cancer and various infections[1]. Vitamin D is a steroid molecule, produced mainly in the skin, which regulates the expression of a large number of genes. The vitamin D receptor (VDR) is usually found in most tissues and cells in the body. The main role of vitamin D is regulating bone metabolism and calcium and phosphorus homeostasis[2].Vitamin D receptors exist in many body organs. Through these receptors, vitamin D has numerous functions, including the regulation of ion homeostasis, cell growth, cell differentiation, and cellular immunity[3].The thyroid gland is also one among the organs that have a receptor for vitamin D.

The vitamin D receptor in the thyroid gland is a member of a large group of receptors called nuclear receptors, which also belong to the thyroid hormones receptor[4]. Many evidence has shown the role of vitamin D in the regulation of proinflammatory cytokines, regulatory T cell, and immune response[5]. The low levels of vitamin D have been attributed to reduced sun exposure and physical activity as well as obesity. It has also been shown that Vitamin D is a selective immune inhibitor that plays a very important role in suppressing and preventing the development of various autoimmune diseases such as encephalopathy, rheumatoid arthritis, systemic lupus erythematosus, Type 1 Diabetes mellitus, and intestinal inflammatory diseases[6-8]. There are many contradicting research work about association between vitamin D insufficiency and thyroid disease -hypothyroidism in particular. Hence it has been decided to study the association between vitamin D3 level and hypothyroidism among patients attending a tertiary care centre.

AIM & OBJECTIVE:

To estimate the level of vitamin D3, serum TSH, Free T3 level , serum calcium and to study the association between vitamin D3 level and hypothyroidism among patients attending a tertiary care centre.

MATERIALS AND METHODS:

This cross sectional study was conducted after getting approval from the Institutional Ethics committee to estimate the levels of vitamin D3, Serum TSH, Free T3, serum calcium and to study the association between vitamin D3 levels and hypothyroidism among patients attending medical outpatient department of a tertiary care centre in south Tamil Nadu. Only willing and eligible participants were included in the study after getting their written informed consent. The total study duration was three months (December 2020- February 2021) Sampling technique used was convenient sampling.

Patients with severe systemic illness and those who were not willing to participate, pregnant and lactating women, patients who were on medications that interfere with thyroid functions were also excluded from the study. Patients newly diagnosed with hypothyroidism alone were included in study group (n=50) and by standers with no systemic illness including hypothyroidism were included in control group (n=50). 25(OH) D was estimated using Beckman-chemiluminescent assay. Serum TSH and Free T3 level were estimated using Electrochemiluminescent Immuno assay (ECLIA). Serum calcium was estimated using automated analyzer by Arsenazo method. Basic demographic details along with the above values were entered in prestructured profoma. The Data collected were entered in excel sheets and analyzed using SPSS software version 23.

RESULTS:

A total of 100 patients were enrolled in the study with 50 in control group (Group I) and 50 in study group (Group II) after getting their written informed consent. Among 50 persons in group I, 30(60%) were male and remaining 20(40%) were female while in group II, 16(32%) were male and 34(68%) were female. Serum TSH, Free T3, serum calcium and vitamin D level were measured in all participants.

Table No.1 Age And Sex Distribution

AGE GROUP	SEX DISTRIBUTION	
	MALE (%)	FEMALE (%)
21-40 years	12(26%)	15(28%)
41-60 years	24(52%)	32(59%)
>60 years	10(22%)	7(13%)
Total	46	54

Table No 2 Mean Values Between Groups

Parameter	Control group	Study group	P value*
	Mean ± SD	Mean ± SD	
S. Calcium	8.98 ± 1.07	7.58 ± 1.29	<0.001
Free T3	2.74 ± 0.73	2.23 ± 0.82	0.004
TSH	4.38 ±1.32	5.84 ± 0.91	<0.001
Vit D3	46.37 ± 23.38	20.11 ± 16.18	<0.001

The mean serum Free T3 in control group was 2.74 whereas in study group it was 2.23 and the p value was significant. The mean serum TSH in control group was 4.38 whereas in study group it was 5.84 and the p value was significant. Vitamin D3 level was insufficient among 24 patients in study group and 7 patients in control group and the mean value was 46.37 and 20.11(insufficient) in control and study group respectively and the p value was highly significant. Mean serum

calcium level was 8.98 in control group and 7.58 in study group respectively and the p value was significant

DISCUSSION:

This cross-sectional study was conducted to estimate the level of vitamin D3, serum TSH, Free T3, serum calcium levels and to study whether there was any association between vitamin D3 levels and hypothyroidism among patients attending a tertiary care centre. Vitamin D is particularly known for its primary role in bone and mineral homeostasis. It has been shown recently that its deficiency is associated with various diseases such as cardiovascular disease, infection, cancer and adiposity as well as osteoporosis. Serum concentration of 25(OH) D is the best indicator of vitamin D status.

In this study, there was no significant difference of vitamin D3 levels between males and females which is in concordance with study conducted by Elsammak MYet al[9]. In a Japanese study they observed a higher level of vitamin D3 among men[10]. Hypothyroidism is a hypothalamus-pituitary-thyroid imbalance in the central axis and insufficient secretion of the regulatory hormones for thyroid gland[11]. Interestingly, it has been shown recently that vitamin D has potent immunomodulatory effects and plays important roles in the pathogenesis of autoimmune diseases. Very limited numbers of studies were performed in the field of evaluating vitamin D effect in non-immune hypothyroidism disease. In a study conducted by Evliyaoglu et al, prevalence of vitamin D deficiency is more common in people with Hashimoto than normal people[12]. In the present study too, a significant association between vitamin deficiency and hypothyroidism was observed whereas Effraimidis et al stated that there is no relationship between vitamin D level and primary stage of autoimmune thyroid disease[13].

Colbay et al. in their study showed negative correlation between TSH and vitamin D level[14]. Similarly in a study conducted by Zhang et al they have observed that higher level of vitamin D leads to a reduction of circulated TSH[15], which are not in concordance with the results of this study. This study showed that vitaminD3 level has a significant association with function of the thyroid gland. The exact molecular mechanism behind this is not clear. Small sample size and cross sectional study design were the limitations of the study. A prospective study with large sample size will help assess the association between vitamin D and thyroid function better.

CONCLUSION:

The study observed that hypothyroid individuals were found to have significant vitamin D3 insufficiency when compared to normal individuals. Hence screening for vitamin D3 deficiency may be useful among hypothyroid individuals.

Conflict Of Interest: NO

Funding: NIL

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