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VITAMIN D DEFICIENCY IN PATIENTS WITH THYROID DISORDER

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ABSTRACT:

OBJECTIVE: *To determine the vitamin D deficiency in patients with thyroid disorder.*

STUDY DESIGN AND SETTING: *This was a cross-sectional study and carried out ant medicine department of Indus medical college Tando Muhammad khan. Study duration was 6 month from December 2016 July 2017.*

MATERIAL AND METHODS: *All the thyroid disorder patients, either gender were studied. All the patients with thyroid carcinoma, diabetes, lactation and known cases of chronic hepatitis excluded from study. 5ml blood was taken from each patient for assessment of vitamin D level. All the data regarding age, gender, hypothyroidism and hyperthyroidism was entered in proforma.*

RESULTS: *Total 67 patients of thyroid disorder were selected, their mean age was 39.75±5.61 years. Female gender was most common as 62.7%. A positive correlation was found between vitamin D level and TSH r-value = 0.015. Total 43.3% thyroid disorder patients were found with vitamin D deficiency, insufficiency was 33.3% and 25.4% patients were with normal vitamin D level. No significant association was found in vitamin D efficiency according to hypothyroidism and hyperthyroidism p-value 0.992.*

CONCLUSION: *It is concluded that vitamin D deficiency was 43.3% and insufficiency was 31.3% and positive correlation was found between vitamin D level and TSH. The pleiotropic roles of vitamin D have been recognized through preclinical and observational studies which have suggested a beneficial role of vitamin D in the management of thyroid disease.*

KEY WORDS: ***Hypothyroidism, hyperthyroidism, vitamin D***

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INTRODUCTION:

Endocrine diseases are common, particularly those of the thyroid gland. Some endocrine glands respond directly to metabolic glands; while most are controlled by hormones released from the pituitary gland [1]. Endocrine diseases are increasing globally but are growing more rapidly in Asia [1,2]. In Nepal, about 0.2% of deaths are because of endocrine disorders, the major cause of which is iodine deficiency. In Pakistan, the prevalence of hyperthyroidism 5.1% and hypothyroidism 4.1% [4]. Thyroid diseases may cause by iodine deficiency, autoimmune disease, inflammation of the thyroid (which may or may not cause pain), caused by virus or bacteria, nodules, or non-cancerous lumps, inside the thyroid, cancerous tumours on the thyroid gland, certain medical treatments, including radiation therapy and some genetic disorders. Autoimmune thyroid diseases, including HT and GD, are the most common organ-specific autoimmune disorders [5]. These AITDs are polygenic diseases resulting from a combination of genetic predisposition (thyroid-specific genes and immune-modulating genes) and environmental triggers (iodine, selenium, drugs, irradiation, smoking, infections, stress, etc.), characterized by lymphocytic infiltration into the thyroid gland and production of thyroid-specific autoantibodies [5,6]. Chronic autoimmune thyroiditis, or HT, is a typical T-cell-mediated autoimmune disease characterized by a diffuse goiter, the presence of anti-thyroid peroxidase (anti-TPO) and/or anti-thyroglobulin (anti-Tg) antibodies in serum, varying degree of thyroid hypofunction, and intrathyroidal infiltration of B and T lymphocytes with CD4+ type 1 T helper (Th1) subtype predominance. In GD, lymphocytic infiltration is mild and involves mainly CD4+ type 2 T helper (Th2) cells, which induce the production of antibodies to bind to the thyroid stimulating hormone (TSH) receptor. This stimulates the growth and function of thyroid follicular cells leading to hyperthyroidism, indicating a humoral immune response.[5] In summary, in genetically predisposed individuals, the disruption of these immune-endocrine interactions by environmental factors is able to shift the balance between Th1-Th2 immune response. This results in a Th1-cell-mediated autoimmune reaction with thyrocyte destruction and hypothyroidism in HT, but in a hyper reactive. Th2-mediated humoral response against TSH receptor (TSHR) with stimulatory antibodies leading to hyperthyroidism in GD [5,7].

Vitamin D plays a significant role in modulation of the immune system, enhancing the innate immune response while exerting an inhibitory action on the adaptive immune system [8,9]. Most immune cells, including T cells, B cells, and antigen-presenting cells (APCs), such as dendritic cells (DCs) and macrophages, express VDR and 1α-hydroxylase [8,10]. At the level of the APCs, 1,25(OH)2D inhibits the surface expression of major histocompatibility complex class II antigens and co-stimulatory molecules, and prevents the differentiation and maturation of DCs as well as their activation and survival, leading to decreased antigen presentation and T cell activation. Several clinical studies have reported a low vitamin D status in AITD or HT, indicating an association between vitamin D deficiency and thyroid autoimmunity. There are approximately 42 million people in India who suffer from thyroid disorders and have not been any clear research to show the association between hypothyroidism and Vitamin deficiency [11].

MATERIAL AND METHODS:

This was a cross-sectional study and carried out ant medicine department of Indus medical college Tando Muhammad khan. Study duration was 6 month from December 2016 July 2017. All the thyroid disorder patients, either gender were studied. All the patients with thyroid carcinoma, diabetes, lactation and known cases of chronic hepatitis excluded from study. Under complete aspetic conditions venous blood was withdrawn from anticubital vein. Levels of T3, T4 and TSH were estimated using fluorescence array. To determine the levels of Vitamin D, 25(OH)D was calculated. Vitamin D deficiency was defined as a serum level of 25OHD of < =20 ng/ml, insufficiency defined as serum level from >20 ng/ml - <30 ng/ml and normal >or=30 ng/ml [12]. All the data was recorded in the proforma for the purpose of analysis. Analysis was performed by SPSS version 16, mean and standard deviation were calculated for quantitative variables, frequency and percentage were calculated for qualitative variables, chi square test was applied to compare the sufficiency and insufficiency of vitamin D level, hypothyroidism and hyperthyroidism. Pearson correlation was applied and a p-value <0.05. was considered as significant.

RESULTS:

In this study total 67 patients of thyroid disorder were selected, their mean age was 39.75±5.61 years. Mean of TSH was 4.70±1.71 μU/mL, mean of T3 was 0.87±0.21 ng/mL and mean of T4 was 9.64±1.75 μg/mL. Mean of vital D level was found 21.29±16.56 ng/ml. **TABLE:1**

Female gender was most common as 62.7%, while

male were only 37.3%. **FIG:1.**
In this series a positive correlation was found between vitamin D level and TSH r-value = 0.015. . **FIG:2**

Total 31.3% thyroid disorder patients were found with vitamin D deficiency, insufficiency was found in 43.3% patients and 25.4% patients were found with normal vitamin D level. No significant association was found in vitamin D efficiency according to hypothyroidism and hyperthyroidism p-value 0.992. **Table 2**

Table 1. Quantitative statistics of patients 67	
Age (mean±SD)	39.75±5.61 years
TSH (mean±SD)	4.70±1.71 µU/**mL**
T3 (mean±SD)	0.87±0.21 ng/**mL**
T4 (mean±SD)	9.64±1.75 µg/**mL**
Vitamin D T4 (mean±SD)	21.29±16.56 ng/ml

n=67

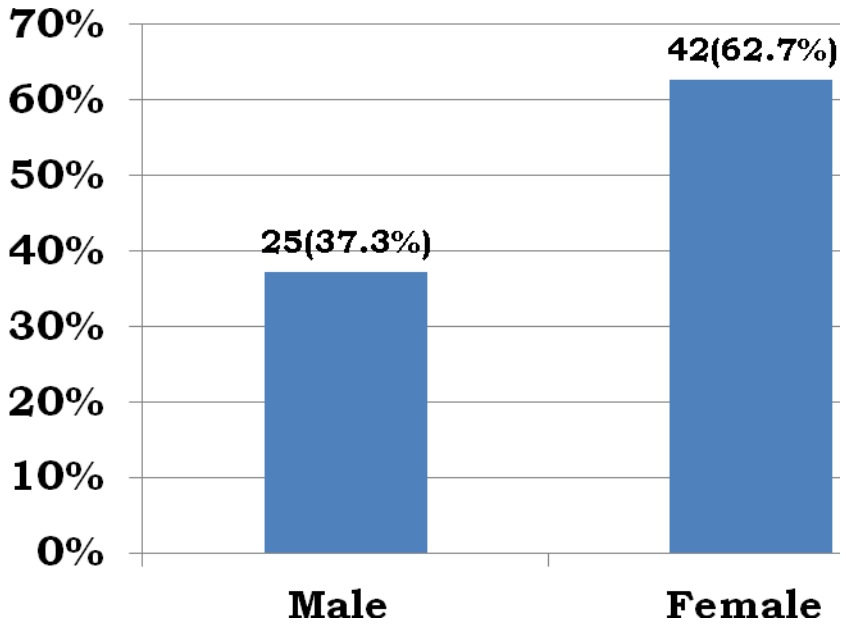
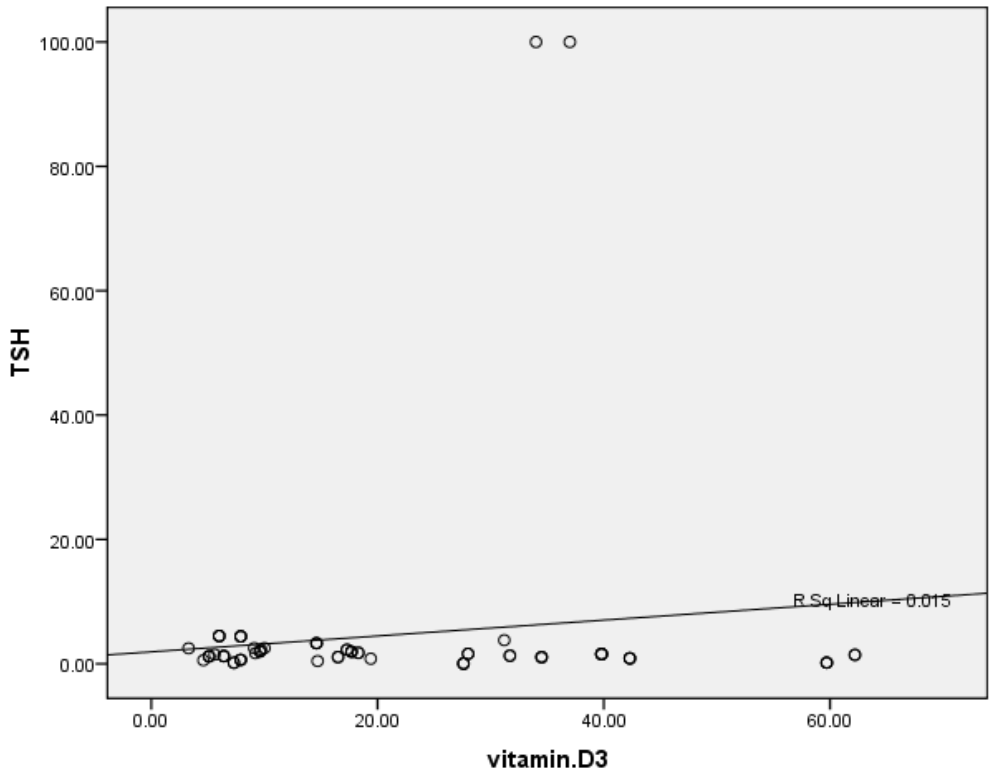


FIG:1. Gender distribution of the patients

Table 2; Vitamin D level in thyroid disorder patients n=74		
Vitamin D level	**Frequency(%)**	**p-value**
Deficiency =20 ng/ml	29(43.3%)	
Insufficiency 20-<30 ng/ml	21(31.3%)	
Normal >30 ng/ml	17(25.4%)	0.992
Total	67(100.0%)	



r-value = 0.015

FIG: 2. Correlation between vitamin D level and TSH

DISCUSSION:

Thyroid hormones have an important role in development, metabolism and energy homeostasis. The secretion of thyroid hormones is controlled by the hypothalamus–pituitary–thyroid axis. Vitamin D is known for its primary role in bone and mineral homeostasis, and it has been shown recently that its deficiency is associated with various diseases female mostly more involved in thyroid disorder. In this study total 67 patients of thyroid disorder were selected and female gender was most common as 62.7%, while male were only 37.3%, their mean age was 39.75±5.61 years. In the favor of this study Kim D et al [13] reported that total of 776 subjects (641 females and 135 males) were enrolled. The mean age was 45.4 years

Most of the patients were presented with hyperthyroidism 65.77%, while patients with hypothyroidism were found 34.30%. In the study of Attaullah S et al[1] stated that prevalence of diagnosis was 214 cases of Euthyroidism (35.7%), 195 Hyperthyroidism (32.5%) and 191 hypothyroidism (31.8%), respectively out of a total 600 cases. On other in the study of Senthil N et al [14] reported that the subclinical hypothyroidism was the most common amongst, 37% and 14% of the study population had hypothyroidism, while subclinical hyperthyroidism was seen in only 4 patients (1.3%) and one patient had hyperthyroidism (0.3%). These findings are inconsistent and this may because in this study all patients were thyroid disorder.

In this study total 43.3% thyroid disorder patients were found with vitamin D deficiency. In the comparison of this study Sonawane S et al [11] reported that Vitamin D deficiency was seen in 59% of the subjects irrespective of the thyroid status. Our findings were in accordance with the study conducted by Koch N et al [15] in North Indian population of Meerut, there were 53.94% subjects who were Vitamin D deficient. Roskies et al [16] retrospectively studied preoperative 25(OH)D levels in 212 patients undergoing thyroidectomy, and showed a higher malignancy rate in the vitamin D-deficient group (25(OH)D level < 37.5 nmol/L) compared to the vitamin D-sufficient group (75% vs. 37.5%), corresponding to a relative risk of 2.0 (p = 0.03), suggesting that vitamin D deficiency is a potentially modifiable risk factor for thyroid cancer [16] Unal et al [17] demonstrated that 254 newly diagnosed HT and 27 GD patients had lower

25(OH)D levels than 124 healthy controls ($p < 0.001$), and serum 25(OH)D levels were inversely correlated with anti-Tg ($r = -0.136$; $p = 0.025$) and anti-TPO ($r = -0.176$; $p = 0.003$) antibodies. Recently, the author reported that the prevalence of vitamin D insufficiency (25(OH)D level < 75 nmol/L) was significantly higher in 369 AITD patients (221 HT and 148 GD) than in 407 non-AITD patients ($p = 0.011$), and was higher in HT patients than in those with GD or non-AITD ($p = 0.017$). In addition, among the HT cases, patients with overt hypothyroidism had a higher prevalence of vitamin D insufficiency ($p < 0.001$) and lower 25(OH)D levels ($p = 0.009$) compared with HT patients with euthyroidism and subclinical hypothyroidism or patients without AITD. Serum 25(OH)D levels were significantly negatively correlated with serum TSH levels after adjustment for age, sex, BMI, and sampling season ($r = -0.127$; $p = 0.013$) [18]. A recent meta-analysis of 20 case-control studies showed that AITD patients have lower 25(OH)D levels and are more likely to be vitamin D deficient compared to controls [19].

CONCLUSION:

It is concluded that vitamin D deficiency was 43.3% and insufficiency was 31.3% and positive correlation was found between vitamin D level and TSH. The pleiotropic roles of vitamin D have been recognized through preclinical and observational studies which have suggested a beneficial role of vitamin D in the management of thyroid disease. Screening for Vitamin D deficiency levels recommended for all patients of thyroid disorder.

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