Association Between Vitamin D Deficiency and Thyroid Hormone in Young Adult in Erbil Government

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***Abstract*— Thyroid glands follicles produce and secrete the Thyroid hormone, through tyrosine residues iodination in the thyroglobulin. Vitamin D it's a fat-soluble vitamin, is found in certain types of food. Vitamin D is produced endogenously when the sun's ultraviolet rays reach the human skin.**

This study aimed to elaborate on the relationship between Vitamin D and thyroid hormone in young adults in Erbil.

The process was done by collecting data from private laboratories, for people who were diagnosed with thyroid hormone abnormalities and tested for Vitamin D. 60 samples were collected from males and females of different ages. Samples were analyzed by Roche Cobas E411.

P value was used to calculate and analyze data, by SPSS 11.5. Pearson chi-square test and Independent Samples Test. Value S0.05 was considered statistically.

The results showed significantly associated relation between Vitamin D deficiency and thyroid abnormalities.

***Index Terms*— Vitamin D, thyroid hormone, thyroiditis, statistical analysis, thyroid gland.**

Key Messages: Evaluating the relation between Vitamin D deficiency and thyroid hormone.

I. Introduction

The thyroid gland produces the thyroid hormone, through the iodination of tyrosine residues Zimmermann MB et al. 2015, Rubio IG et al. 2009. Thyroid hormone is necessary for metabolism, growth, and development [1, 2]. These actions become more visible in thyroid hormone deficiency during development, more specific defects are caused by ligand deficiency in adults [3].

Vitamin D, also known as calciferol, is a type of fat-soluble vitamin that can be found in some foods. Additionally, exposure to UV rays can stimulate the production of Vitamin D within the body. The user's text is a single letter "F". Holick M et al. published a study in 2011 [4].

An elevated occurrence of autoimmune thyroiditis has been observed in conjunction with a lack of Vitamin D. The study was conducted by Bizzaro and colleagues in 2015 [5].

This study aims to investigate the correlation between vitamin D deficiency and thyroid hormone levels in young individuals

II. Material and Methods

The present study was conducted by collecting data in Erbil city from two different private diagnostic laboratories (Sheery daik & Mihrabani), We searched for population files from the laboratory in recent months from December, January, and February to collect data that have diagnosed with thyroid hormone abnormalities and tested for Vitamin D in order to check if there is any relation between Vitamin D deficiency with thyroid hormone abnormalities. The number of samples collected was 60 samples from both males and females of different ages. 20 samples out of 60 were from patients that do not have any thyroid abnormalities and 40 of them were from patients diagnosed with thyroid abnormalities, blood samples from patients were withdrawn and analyzed by Roche Cobas E411 for each TSH, T3, T4, and Vitamin D3 respectively.

A. Statistical Analysis

The data analysis and measurement of the p-value were conducted using SPSS version 11.5 software. The association between vitamin D and thyroid hormones was examined using the Pearson chi-square test and Independent Samples Test. The statistical significance of value S0.05 was taken into account.

III. Results

A total of 60 samples from different age groups were investigated, male and female randomly, in our study the mean of vitamin D was 22.81 and TSH was 10.29, T3 was 5.16 and T4 123.59 respectively as shown in (Table 1). Regarding vitamin D minimum was 8.50 however maximum was 36.31 also the TSH minimum was 0.01 while the maximum was 98.80 as shown in Table 1.

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TABLE I
SHOWS THE DESCRIPTIVE STATISTICS FOR VITAMIN D AND TSH, T3 AND T4.

	Mean	Standard Deviation	Minimum	Maximum	Range
Vitamin D	22.81	7.48	8.50	36.31	27.81
TSH	10.29	18.15	0.01	98.80	98.79
T3	5.16	17.21	0.90	96.08	95.18
T4	123.59	34.05	73.00	180.00	107.00

TABLE II
DESCRIPTIVE STATISTICS FOR VITAMIN D AND TSH, T3 AND T4 IN THE COMPARISON BASED ON SEX.
BASED ON THE COMPARISON BETWEEN GENDERS, THE RESULTS SHOWED THAT THE MEAN IN VITAMIN D IN MALES (28.20), IN FEMALES (20.11). TSH IN MALES (7.02), IN FEMALES (11.93). T3 AND T4 (2.08, 126.99) IN MALES, (6.71, 121.89) IN FEMALES.

	males					females			
	Mean	Standard Deviation	Minimum	Maximum	Range	Mean	Standard Deviation	Minimum	Maximum
Vitamin D	28.20	4.13	21.04	36.31	15.27	20.11	7.37	8.50	36.00
TSH	7.02	1.70	4.36	10.50	6.14	11.93	22.20	0.01	98.80
T3	2.08	0.73	1.05	3.00	1.95	6.71	21.08	0.90	96.08
T4	126.99	30.06	87.31	175.00	87.69	121.89	36.50	73.00	180.00

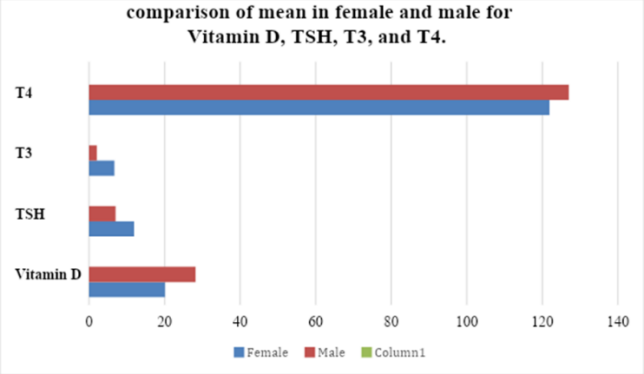

Fig 1. Displays the mean values in females and males for Vitamin D, TSH, T3, and T4.
As it is shown, the highest mean value was T4 for both females and males.

TABLE III
INDEPENDENT SAMPLES TEST TO COMPARE MEAN
THE MEAN IS HIGHLY SIGNIFICANT P<0.05** FOR MALES WITH VITAMIN D DEFICIENCY AND SIGNIFICANT FOR FEMALES BUT NOT SIGNIFICANT FOR T3, T4, AND TSH P>0.05 IN MALES AND FEMALES RESPECTIVELY.

Independent Samples Test to compare mean

Gender		N	Mean	Std. Deviation	p*
Vitamin D	male	10	28.198	4.132	p<001**
	female	20	20.110	7.368	(s)
TSH	male	10	7.015	1.698	p>0.05
	female	20	11.929	22.198	(n.s)
T3	male	10	2.080	0.733	p>0.05
	female	20	6.707	21.081	(n.s)
T4	male	10	126.991	30.061	p>0.05
	female	20	121.885	36.505	(n.s)

TABLE IV
THE ASSOCIATION BETWEEN VIT. D AND TSH, T3 AND T4
IN TABLE 4 THE ASSOCIATION BETWEEN VIT. D AND TSH, T3 AND T4 WERE NOT SIGNIFICANT P>0.05 AS IN THE RESULTS CHI-SQUARE TEST USED TO ANALYSE.

		Vitamin D				
		Abnormal		Normal		p*
		Count	%	Count	%	
Gender	male	11	27.5%	3	7.5%	p>0.05
	female	22	55.0%	4	10.0%	
TSH	Abnormal	33	82.5%	7	17.5%	N/A
	Normal	0	0.0%	0	0.0%	
T3	Abnormal	14	35.0%	5	12.5%	p>0.05
	Normal	19	47.5%	2	5.0%	
T4	Abnormal	9	22.5%	1	2.5%	N/A
	Normal	24	60.0%	6	15.0%	

TABLE V
INDEPENDENT SAMPLES TEST TO COMPARE THE MEAN OF VIT. D TSH, T3 AND T4
IN TABLE 5 THE RESULTS AS SHOWN WERE ALSO NOT SIGNIFICANT P>0.05 AS RESULTS WERE COMPARED BY MEAN AND INDEPENDENT SAMPLES TEST TO COMPARE MEAN WAS USED.

Vitamin D		N	Mean	Std. Deviation	p*
TSH	Abnormal	33	14.710	21.539	p>0.05
	Normal	7	11.992	9.325	(n.s)
T3	Abnormal	33	4.849	16.425	p>0.05
	Normal	7	1.639	0.860	(n.s)
T4	Abnormal	33	119.891	46.088	p>0.05
	Normal	7	124.314	44.743	(n.s)

IV. DISCUSSION

The present study investigated the correlation between vitamin D insufficiency and thyroid hormone levels in young individuals residing in the Erbil region. The total number of samples taken and analysed was about 60 samples 40 from the population with abnormal thyroid hormones and 20 from normal thyroid hormones, we looked for their vitamin D and compared if vitamin D affects or has any relation to the thyroid effects, according to the results has been shown in the tables (1-5). Samples were from different age populations from different genders randomly.

The analysis of the relationship between Vitamin D and thyroid hormone yielded non-significant findings, in Tables 1 and 2 the comparison was done by dependent and finding out the association between the parameters, while in Table 3 as we compared the parameters dependently, we found out the rate of vitamin D deficiency was highly significant in male and significant in female. The findings indicate that there is no direct correlation between vitamin shortage and thyroid problems. However, there was a strong statistical significance observed for vitamin D deficiency in Table 3 when comparing independent parameters.

Vitamin D plays a major role in the metabolism of minerals and bone formation, and deficiency in Vitamin D can be associated with cancer, infection, and osteoporosis Vilarrasa N et al. 2010. Low levels of Vitamin D are related to autoimmune diseases [6]. Deficiency in Vitamin D is a global problem across the world [7].

ElRawi, et al. [8] established a direct relationship between low vitamin D levels in individuals with

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hypothyroidism and increased insulin resistance. Furthermore, this correlation was found to be statistically significant with higher levels of anti-thyroid antibodies, specifically anti-TPO and anti-TG. In a study conducted by Talaei et al. in 2018, it was found that administering a 50,000 IU vitamin D supplement to individuals with hypothyroidism resulted in a decrease in their levels of thyroid-stimulating hormone (TSH) and parathormones [9]. However, there was no noticeable effect on their serum thyroxine (T3 and T4) levels. Ucan, et al. [10] discovered that individuals with autoimmune Hashimoto's thyroiditis experienced significant improvements in their thyroid function, a decrease in autoimmune antibodies, and an increase in free T4 (fT4) levels when they were given an equivalent oral vitamin D supplement. Mirhosseini, et al. [11] A sizable portion of participants in a large cohort showed improvement in their thyroid condition after taking vitamin D supplements. Chahardoli, et al. [12] discovered that taking vitamin D supplements greatly lowered the levels of anti-Tg antibodies and the tropic hormone TSH. discovered that taking vitamin D supplements greatly lowered the levels of anti-Tg antibodies and the tropic hormone TSH [13]. Smith et al. 1989 Discovered that the basal state of pituitary thyrotropin TSH release was considerably decreased by exogenous vitamin D treatment [14]. Additionally, this study discovered that middle-aged and older women had greater serum TSH levels than men of the same age. This finding was consistent with other results [15, 16]. This finding may suggest that sex hormones, genetic predisposition, or environmental factors govern TSH secretion. These factors may also operate as a mediator in the association between blood TSH levels and vitamin D status [17]. Vitamin D has been demonstrated to have a significant role in the estrogen production of both female and male gonads, and another earlier study demonstrated that circulating estrogen could cause rapid serum TSH suppression in males by acting on the pituitary gland [18]. On the other hand, it has been noted that administering estrogen can both raise and decrease [19]. 1956 or doesn't affect a woman's thyroid activity [20]. Consequently, it is reasonable to assume that estrogens and serum TSH secretion in females have a complicated relationship, which may help to explain why this association exists exclusively in males. The lack of correlation between vitamin D status and serum TSH levels in people with positive thyroid antibody titres may have resulted from the small sample size, particularly when the subjects were split into two gender-specific groups. To shed more light on this association, more clinical research including a bigger sample size is needed to clarify how vitamin D affects thyrotropes. Using sample data, our study concludes that there is a connection between thyroid problems and vitamin D deficiency.

Conclusion

The study highlights the association between vitamin D deficiency and thyroid abnormalities using representative data. The patients with hypothyroidism suffered from hypovitaminosis D with hypocalcaemia that is significantly associated with the degree and severity of the hypothyroidism. Future large-scale experimental studies are needed to verify the results of our study. Based on the results of our study, healthcare initiatives such as universal screening for vitamin D deficiency among at-risk populations such as the elderly, indoor, obese, and sedentary individuals and immediate treatment with nutritional supplements can significantly reduce the risk of developing hypothyroidism.

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