Study The Relationship between Vitamin D deficiency and Thyroid disorders in sample of Iraqi patients

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Abstract

The deficiency of vitamin D is a common health problems all over the world, its role in many diseases is being studied recently. However, its role in thyroid diseases is not well established yet. In this study, 120 Iraqi samples with age ranged between (30 and 55) years participate in this research, divided in two groups, The first group which diagnosed as having vitamin D deficiency consists of(31 male and 29 female), and the other group contained normal people which play as control group consists of (28 male and 32 female). As we found from our results that the vitamin D was significantly positive correlated with T3 in both groups, TSH was only significantly negative correlated with vitamin D in the patients' group, we found that the results of T3, T4 and TSH were significantly correlated in the patients' group only and they were not correlated in the control group. With regard to age we found not contributing to the means vitamin D in both groups.

Keywords: Vitamin D deficiency, Thyroid function parameters, thyroid-stimulating hormone (TSH), thyroxine (T4), triiodothyronine (T3)

1. Introduction

Scientifically, it is a well-known fact that vitamin D is a nutrient that produced by human bodies when exposed to sunlight. Vitamin D deficiency is a health problem that is scattered all over the world[1]. It is also believed that about 50% of the people in our world do not get enough sunlight [1, 2].

According to Z Lu et al.,2007, a quantity of 800 IU (20 mcg) of vitamin D is recommended from the daily food intake. When sunlight is not enough to be exposed to, the daily intake should be approaching 1000 IU (25 mcg) [3].

It is also known that vitamin D can be obtained from different sources, in order to ease the classification of such sources, two main types can be realized, the first one is D_3 (or cholecalciferol) which is synthesized in the skin when people exposure to sunlight that involved a wide spectrum of rays including ultraviolet B radiation UVB that plays the essential role in the process of vitamin D. There are also some foods like fatty fish which is considered a good source of it. The other type of vitamin D is that produced by some sorts of plants and fungi [4, 5]. These types of vitamin D are processed and converted in liver to 25-hydroxyvitamin D (25(OH)D or calcidiol) by 25-hydroxylase (CYP27A1 and CYP2R1). It is proved that 25(OH)D is the essential stored preserved form of vitamin D by which the serum levels can be rely on measuring the content of vitamin D in the body [4-6]. Many researchers revealed the essential role of vitamin D in the modulation of immune system by enhancing the immune action during the operation of inhibition response on the adaptive immune system [6, 7].

Vitamin D believed to be responsible for bone health because it maintain calcium and phosphorus homeostasis. Vitamin D is also responsible for some disorders that found accompanied the low levels of it. Actually, low levels of vitamin D can be considered as a serious medical issue that threatening the public health. Prevalence of this medical problem in children, young and middle-age people is found to be similar to that of elderly making this problem a nightmare that should be seriously confronted [8].

In some studies a remarkable homology was found between the molecular structure of vitamin D3 and thyroid hormone receptor. However, they did not observe any significant vitamin D receptor polymorphism in subject vs control suggesting that correction with vitamin D supplements may possibly have a therapeutic benefit in correcting thyroid status s9].

In an experiment on rats, 1,25(OH)2D3 was administrated for three days and found that it has not affect T3, T4 or TSH. Such results establish the basis for further research work on vitamin D and thyroid diseases. According to the Office of Dietary Supplements, the following **(table-1)** shows the daily amount of vitamin D that should be intake with regard to age:

(Table 1)Average daily recommended amounts in micrograms (mcg) and International Units (IU)	
Age	**Amount**
0-12 months	10 mcg or 400 IU
1-70 years	15 mcg or 600 IU
71+ years	20 mcg or 800 IU
And (table-2) below shows a rough guide for the three status of vitamin D in human bodies.	
Level	**Blood Test Result**
Low	12 ng/ml or below
Adequate	20 ng/ml or above
High	50 ng/ml or above

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(table-2) A rough guide for the three status of vitamin D in human bodies.

In this study we aimed to evaluate the effects of vitamin D deficiency on thyroid function which investigated among two groups of people, control and patients.

Patients and methods

Two groups of people were considered in this study each with 60 person. The first group is those who have already diagnose as Vitamin D deficiency, whereas the other group plays as control group. Information about age, gender, and parameters of thyroid disease such as T3, T4 and TSH were recorded for all individuals involved in this study.

This study was conducted in a period from March to May 2020 on total number of 120 subjects, their age rang (30-50 years).It including 31 male deficiency of vitamin D3, 29 female deficiency of vitamin D3 and healthy (control group) control group consists of 28 male and 32 female. Serum (T3, T4 and TSH) was measured by TOSOH AIA 360 System Analyers. and supplied by TOSOH Bioscience, Japan. Serum of Vitamin D3 was measured by Minividas using a kit supplied by BioMeriux-France.

Relationship of thyroid parameters with age and gender will be investigated with respect to the groups once and within each group once again to see how these parameters are associated with each other as well as with age.

All data were collected from private clinics during the period 1st of September to 31st October 2020. The data were subjected to statistical analysis (T-test for two means and person correlation. SPSS ver. 25) will be used for this purpose.

2. Results

The control group consists of 28 male and 32 female (male: female ratio is 0.85:1), patients group consists of 31 male and 29 female (male: female ratio is 1.08:1). The Chi-square test for comparing two proportions indicated that there is no significant difference between the two groups with respect to proportion of gender (Chi-square = 0.36 and p-value = 0.55).

The t-test for comparing two means indicated that no significant differences were found between means age with respect to gender in both groups as well as for the total number of individuals in both groups. Accordingly, the two groups are theoretically identical for comparison in terms of age and gender. Table 3 shows the results of t-test used for comparing two means regarding all parameters considered in this study with respect to group and gender. Means T4 for males and TSH for males, females and total, were found not significantly different. All other means were significantly different as stated in the table.

(Table 3) The comparing of level D3, T3, T4, TSH and Age with respect to gender and groups.

Parameter	Gender	Group				t-test	p-value
		Control		Patients			
		N	Mean±Sd	N	Mean±Sd		
D3 (ng/mL)	Male	28	38.00±6.78	26	11.84±5.65	14.56	0.0001
	Female	32	38.85±5.91	24	11.05±6.26	16.25	0.0001
	Total	60	38.46±6.27	50	11.46±5.91	22.16	0.0001
T3 (nmol/L)	Male	28	1.20±0.42	26	3.07±3.80	-2.5	0.02
	Female	32	1.27±0.52	24	3.35±3.27	-3.08	0.005
	Total	60	1.24±0.48	50	3.21±3.52	-3.92	0.0003
T4 (nmol/L)	Male	28	7.36±1.49	26	9.10±5.25	-1.62	0.12
	Female	32	6.84±1.57	24	9.61±4.84	-2.67	0.013
	Total	60	7.08±1.54	50	9.34±5.01	-3.049	0.003
TSH (mU/L)	Male	28	2.80±1.64	26	4.36±4.35	-1.69	0.1
	Female	32	3.63±1.62	24	4.62±4.74	-0.97	0.34
	Total	60	3.25±1.67	50	4.49±4.50	-1.82	0.074
Age	Male	28	41.30±6.15	26	39.46±5.74	1.083	0.284
	Female	32	36.81±5.66	24	39.63±6.76	-1.621	0.12
	Total	60	38.88±6.25	50	39.54±6.18	-0.531	0.597

In order to know how the thyroid parameters act in normal people and patients, the Pearson correlation coefficients each pair of parameters was obtained once for the control group (normal people) as in table 4, and another for patients as in table 5. The main concern in both groups was to see how vitamin D is associated with considered parameters in each group.

With respect to the control group, vitamin D was found to be only significantly positive correlated with T3. T4 is only significantly positive correlated with age. TSH was not significantly correlated with any of the parameters involved in table 4.

On the other hand table 3 of the patients showed that vitamin D was found significantly positive correlated with T3 and significantly negative correlated with TSH. In addition T3 was found significantly negative correlated with TSH.T4 was significantly positive correlated with T3 and significantly negative correlated with TSH. Age was not significantly correlated with of the other parameters stated in the table.

Table 4. The correlations between all parameters of the control group.

		T3	T4	TSH	Vit. D3	Age
T3	Pearson r	1	-.130	.018	.319*	.181
	Sig.(2-tailed)		.368	.903	.024	.207
T4	Pearson r	-.130	1	.026	-.124	.338*
	Sig.(2-tailed)	.368		.857	.392	.016
TSH	Pearson r	.018	.026	1	.047	-.022
	Sig.(2tailed)	.903	.857		.744	.880
Vit. D3	Pearson r	.319*	-.124	.047	1	.085
	Sig.(2tailed)	.024	.392	.744		.556
Age	Pearson r	.181	.338*	-.022	.085	1
	Sig.(2tailed)	.207	.016	.880	.556	

*Correlation is significant at the 0.05 level(2-tailed)

Table 5. The correlations between all parameters of the patients group.

		T3	T4	TSH	Vit. D3	Age
T3	Pearson r	1	.615**	-.484**	.323*	.153
	Sig.(2-tailed)		.000	.000	.022	.288
T4	Pearson r	.615**	1	-.791**	.228	.143
	Sig.(2-tailed)	.000		.000	.112	.322
TSH	Pearson r	-.484**	-.791**	1	-.319*	.006
	Sig.(2tailed)	.000	.000		.024	.967
Vit. D3	Pearson r	.323*	.228	-.319*	1	.052
	Sig.(2tailed)	.022	.112	.024		.718
Age	Pearson r	.153	.143	.006	.052	1
	Sig.(2tailed)	.288	.322	.967	.718	

**,Correlation is significant at the 0.01 level(2-tailed).
*, Correlation is significant at the 0.05 level(2-tailed).

3. Discussion

vitamin D deficiency related with many pathogenesis of autoimmune disease, where the most common autoimmune are thyroid diseases [10]. Epidemiological studies revealed a widespread prevalence of vitamin D deficiency. In this context, similar epidemiological studies must taking place in Iraq in order to estimate the prevalence of it and to what extent it is related to thyroid disease. It is very important to state that in India they found vitamin D deficiency in 53.94% of subjects irrespective of thyroid hormone status [11, 12]. Moreover, there are some evidence suggesting an association between vitamin D [25(OH)D, the form by which vitamin D status is measured in blood] deficiency and autoimmune thyroid diseases (e.g., Hashimoto's thyroiditis and Graves' disease, and/or postpartum thyroiditis), and a relationship between vitamin D levels and titers of antibodies and thyroid autoimmunity replacement [13].

The main goal of this prospective study was to determine the relationship between deficiency of vitamin D and thyroid dysfunction or disease,

On comparing the two groups, serum TSH level was significantly higher in patients group than that of controls. When serum TSH levels in patients were compared regarding to the sex, we noticed a non-significant difference between males and females patients table (3), this agree with other studies [14].

Serum T3 and T4 were significantly higher in controls than those of hypothyroidism (t= 4.78, t= 5.48, P = 0.000) respectively.

mean serum TSH was significantly higher in the patients group than in the control group (table 3). This is in agreement with other studies [11, 12]. It suggested that vitamin D does have a role to play in hypothyroidism, and this back to both vitamin D receptors and thyroid hormone receptors are similar called (steroid hormone receptors), and a different gene in Vitamin D receptor was shown to influence people to autoimmune thyroid disease.

although a causal relationship could not be established. But there are some studies that reported both normal and decreased concentrations of vitamin D in patients with thyroid disorders [15], and for the same explanation above

A significant negative correlation was found between vitamin D in patients' group and TSH (r=-0.319, p=0.024) suggesting the existence of inter relationship between vitamin D deficiency and thyroid disorders. This is in accordance with that of other studies.

T3, T4 and TSH were not significantly correlate in the control group, whereas all these parameters were significantly correlated in the patients' group. T3 and T4 were significantly negative correlated with TSH in the same group of patients.

The significant correlation of vitamin D with T3 in both groups of individuals might suggest that vitamin D alter T3 secretion.

T4 is the only parameter that found significantly positive correlated with age in the control group (table 4).

4. Conclusion

Vitamin D deficiency is still a challenge health problem. Many studies came up with some several findings that support the role of vitamin D in the pathogenesis of thyroid diseases. Age and gender were found to be not contributing to the levels of vitamin D neither in the control group nor in the patients' group.

Currently, there is not enough strong evidence to support screening for vitamin D deficiency or vitamin D supplementation in thyroid profile. Several factors will be still considered in future studies, such as seasonal adjustment of vitamin D levels, and variable populations.

As a matter of fact there is a considerable amount of discrepancies in the literatures with the same or even similar concern, such discrepancies could be due to variety of factors, such as the severity of illness, duration of illness, the dietary regime, type of supplement intake, and perhaps many others. In this context further studies are needed to capture as much as possible of these factors in order to come up with more reliable conclusion.

5. References

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