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Effect of Hashimoto Disease in Diabetic Patients in National Center for Diabetes

Abstract: *The most two common autoimmune disease in endocrinology was Diabetes mellitus (DM) and thyroid dysfunction (TD). This study aimed to investigate the prevalence of TD in DM patients of type 1. The current study is carried out in the National Center for Diabetes of Endocrine and Genetic (NCDEG), AL- Mustansiriyah University, Baghdad. This study comprised of (36) patients with hypothyroidism diagnosed clinically under supervision of specialist physician in endocrinology. Their ages ranged between (30-40) years, among them there were 17 males (48%) and 19 females (52%). In addition there were (36) healthy control their age ranged between (28-42) years, among them there were 21 males (58%) and 15 females (42%). Results showed highly significant increase in the rate of Chol, TSH, T3, and FBS in patient group when compared with healthy subject ($p<0.001$), also highly significant decrease of T4 ($p<0.001$). The prevalence of thyroid dysfunction among type 1 DM patients is very high with hypothyroidism is being most common. This study recommended that screening of thyroid function must be done especially in uncontrolled diabetic patients.*

Keywords: *Type I Diabetes mellitus, Hashimoto disease, Thyroid hormones*

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1. Introduction

The most two common autoimmune disease in endocrinology was Diabetes mellitus (DM) and thyroid dysfunction (TD) [1]. Various studies have found association between them and this tend to coexist [2]. This study aimed to investigate the prevalence of TD in DM patients of type 1 and to find the correlation between thyroid profile and diabetes mellitus. Most of people have diabetes mellitus frequently have immune disease Hashimoto's Thyroiditis (HT), in this type of disease thyroglobulin antibodies try to attach thyroid gland and the titers of thyroid peroxidase will increase following with increasing TSH specially if the patients without any medications and positive family history of the disease[3]. Various studies were approved association in different type like evidenced biochemical, genetic, and hormonal relations [4]. Hashimoto's thyroiditis has been investigated in this study to be associated with DM.

People with HT develop hypothyroidism and this low level of thyroid hormones causes high levels of cholesterol, this can lead to cardiovascular diseases. Also untreated hypothyroidism lead to extreme form of hypothyroidism like myxedema coma, which is requires urgent medical treatment, so in this type of coma body's functions slow to the point that it becomes threaten the patient life [5]. Various studies [6] explain why some people have autoimmune disease like HT, and this result from a combination two causes: genes and an outside trigger, such as a virus.

The incidence of HT is on the rise. Most cases diagnosed as hashimotos thyroiditis were in a hypothyroidism status. There was strong relationship between abnormal thyroid functions and cardiovascular disease, especially in hypothyroidism, this because high levels of cholesterol and hypertension even in hypothyroidism and hyperthyroidism have been related to increased risk of coronary heart disease [7].

2. Materials and Methods

This study is carried out in the National Diabetes Center Alyarmouk teaching hospital in Baghdad. Its comprised of (36) patients with hypothyroidism diagnosed clinically under supervision of specialist physician in endocrinology. Their age ranged between (30-40) years, among them there were 17 males (48%) and 19 females (52%). In addition there were (36) healthy control individuals their ages ranged between (28-42) years, among them there were 21 males (58%) and 15 females (42%),as shown in Table 1.

Table 1: Number and age of patients and control

	Patients (36)	Control (36)

	male	female	male	female
number	17	19	21	15
%	48%	52%	58%	42%
Age(M ± SD)	35.29±2.86		36.61± 3.54	
p-value	0.293		0.025	

Serum collected from the patients to measure the level of thyroid function tests T3 and T4 by minividas technique and TSH by using Enzyme linked Fluorescent assay (ELFA) which were taken and also to know the correlation between thyroid function and diabetes mellitus, also cholesterol and FBS were measured in this study colourimatrically.

Statistical analysis

Results were analyzed by using T-test SPSS version 21.P-value consider significantl ($p<0.05$) and highly significant ($P< 0.001$).

3. Results and Discussion

Our results showed highly sig. increase in the conc. of Chol, TSH, T3, and FBS when compared patient group with control ($p<0.001$), also there were highly sig. decrease in conc. of T4 ($p>0.001$) as shown in Table 2.

Table 2: Biochemical parameters between patient group and control.

parameters	M ± SD Patients	M ± SD Control	P-value
Age	34.75±3.03	35.64±4.06	0.313
TSH	14.59±5.16	2.69±1.151	0.00
T4	41.04±15.47	107.37±23.33	0.00
T3	3.76±0.59	1.29±o.29	0.00
FBS	189.89±35.101	89.94±6.67	0.00
Chol.	336.97±60.36	164.89±10.36	0.00

The comparison of biochemical parameters between female only of patients and control groups were clarified in the Tables (3a) and (3b), there were highly significant difference in all parameters.

Table 3a: Comparison of only female (patients and control)

female					
T3		FBS		Cholesterol	
Pat.	Cont.	Pat.	Cont.	Pat.	Cont.
.582	1.2667	184.052	90.20	339.0	164.533
.371	.39219	37.694	6.427	72.308	9.1874
.000		.000		.000	
1.1	2.00	297.00	100.00	501.00	184.00
.01	.80	138.00	75.00	200.00	148.00

Table 3b: Comparison of only female (patients and control)

female				
	TSH		T4	
	Pat.	Cont.	Pat.	Cont.
mean	15.194	2.566	39.988	105.133
SD	5.890	1.133	17.558	24.789
P-value		.000		.000
max	30.20	4.50	80.00	150.10
min	6.80	.80	10.20	65.10

In Tables (4)a and (4)b the comparison of biochemical parameters between male only in patient and control groups, there were highly significant difference in all parameters except T3,there were non-significant increase between patients and control groups.

Table 4a: Comparison of only male (patients and control)

male						
	TSH		T4		T3	
	Pat.	Cont.	Pat.	Cont.	Pat.	Cont.
mean	14.864	2.790	42.082	108.590	.9412	1.304
SD	5.684	1.201	14.247	23.1468	.73998	.2036
P-value	.000		.000		.075	
max	30.10	5.00	75.00	142.10	2.10	1.70
min	7.30	1.200	10.20	70.200	.10	1.000

Table 4b: Comparison of only male (patients and control)

FBS		Cholesterol	
Pat.	Cont.	Pat.	Cont.
199.1765	89.5238	333.4118	165.1429
43.83383	6.80896	60.30864	11.33704
.000		.000	
306.00	100.00	425.00	182.00
148.00	78.00	235.00	145.00

There was antagonist effect betweenT3, T4, and TSH with insulin, this indirectly potentiate the insulin action. The synthesis of thyroid releasing hormone (TRH) were decreases in diabetes mellitus. These are the main reason responsible of low levels of thyroid hormones in diabetic patients. Generally, TSH reading above normal means a person has hypothyroidism [8].

Thyroid stimulating hormone levels were increased highly sig. in type 1 diabetic patients when compared with healthy subjects ($p<0.001$). hypothyroidism observed in the results of the present study and this in accordance with the results of [9,10] This study found and recommended that thyroid screening is essential among DM patients in order to detect hypothyroidism and this in the same line of study of Aziz [11]. Abnormal levels of thyroid

hormones may be the outcome of many medications receiving from DM patients.For example, insulin is an anabolic hormone, and it enhances the levels of T4 and suppresses the levels of T3 by make inhibition of hepatic conversion of T4 to T3. In addition, oral hypoglycemic like phenylthioureas known to suppress levels of T4 and T3, in the same time it causes to raised levels of TSH [12]. Type 1 DM patients were on insulin injection and also on oral hypoglycemic agents, firstly this explain the finding of the *results* of this study of abnormal thyroid hormones levels in diabetic patients ($p<0.001$), secondly due to modified of the synthesis and release of TRH also it may be depend on the status of glycaemia in DM patients, that is to mean: insulin is the most affecting factor on glycaemic status which is regulate TSH and TRH levels. There is an inhibitor, Thyroid hormone binding inhibitor (THBI), responsible of conversion extra thyroid enzyme(5-deiodinase) of T4 to T3, this attributed to hypothyroidism and also the hypothalamo pituitary thyroidaxis dysfunction. These statuses aggravated and prevail in DM patients especially poorly controlled diabetics [13]. There are two mechanisms that DM influence thyroid function: the first one when hypothalamic control the release of TSH, and the second mechanism happened in the at peripheral tissue through converting T4 to T3. In case of Hyperglycaemia the following alteration occurs:

1. Reduction in hepatic concentration of 5-deiodinase enzyme.
2. Low levels of T3.
3. Increasing of levels of reverse T3.
4. Low, normal, or high level of T4.

This mean that the metabolism in diabetes mellitus change in thyroid dysfunction. The association between diabetes mellitus and thyroid dysfunction is repeatedly proven in internal medicine, which is clear evident. Hypothyroidism and hyperthyroidism chiefly consider disorder in thyroid function, although the tow status belongs to the same organ (thyroid gland) but the difference in pathophysiology as well as clinical picture are clear. Researchers investigate the interface between thyroid malfunction owing to DM. literatures discuss that endocrinal dysfunction causes stimulation of a serious reactions which are actually in nature antihomeostatic. Like, hypoadrenalism and hypopituitarism exhibits strong association with hypothyroidism and consequently DM [14].

Hashimoto's thyroiditis(HT) is common in women than men specially in age 30 to 50 years old. Although this disease occurs in young or adolescent women. This agree with the present study. Various studies [15] suggests that the most causes of this disease was gene or genes and they working to be passed from one generation to the next. In study of Caucasian populations have IDDM is equally prevalent among both gender (male and female), the gender distribution suggests that risk factors does not have relation with IDDM but it associate with HT. In addition, we can see the gender specific factors explain the highly observed prevalence of other autoimmune diseases among hypothyroid cases have HT, most of them were women. Stratified analyses showed a statistically significant difference for men, but not women. Generally diabetic women, were more likely to have other autoimmune diseases, whereas men with HT appeared to be predisposed to these disorders. The gender-specific risk factors is the explanation that are responsible for a high prevalence of these disturbance in women than men. That is mean the detect of HT is easy in men because they have low risk to infect the disease [16].

Hashimoto thyroiditis generally manifests in two phases clinically: the first phase is a hyperthyroid and the second one is euthyroid phase.in the case of hypothyroid due to either iodine intake or to disorder of the immune system like silent thyroiditis and postpartum. While the second phase is asymptomatic and sometimes lasting for decades [15].

This results observed highly significant increase of cholesterol in hypothyroid patients and this consider as risk factor for cardiovascular diseases. The risk of coronary heart disease (CHD) and other forms of atherosclerotic vascular disease rises with rising plasma cholesterol levels. Although there is no clear evidence that hypothyroidism causes coronary artery disease, but hypothyroidism increases the oxidation of cholesterol, which presents substrate for oxidative stress [16]. Study of Bayar Qasim [17] in a case control study showed that total cholesterol level was statistically higher among hypothyroidism diabetic patients in comparison to non-diabetic ($p<0.001$) and this is coincided to this study.

The present study shows association between patients have hypothyroidism according to T3 andT4 and dyslipidemia (Chol. Levels) and this agree with the results of Brenta [18], which also find the same results. About 75% of total cholesterol was produced from liver cells. Special protein was necessary to activate thyroid hormones receptors, this regulate the expression of special protein. Thyroid hormones affect by their indirect action to modify regulation of

insulin and catecholamine through expend the basal ene The metabolism of the body be slow when the thyroid gland in underactive and this will decrease the ability of liver to remove the cholesterol from circulation .When liver ability to remove cholesterol from circulation decrease the cholesterol levels will be high and this consider as a sign of a hypothyroidism [20]. The liver responds to high levels of cholesterol by production of receptor bad from cholesterol LDL receptors and sit on the cell surface and begin attach cholesterol in the blood as it filters through then the filtered cholesterol converted into bile acids that used to synthesis hormones and other substances [21].

Conclusion

The conclusion of this study was found that there were a strong relationship between thyroid disorders and diabetes mellitus that is lead to classical risk factors such as dyslipidemia, which can also lead to cardiovascular risk in these patients. The screen test for thyroid gland among those patients with should be routinely be done.

5. References

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Appendix

Table 5: correlations between all the parameters

		Gander	Age	TSH	T4	T3	FBS	Cholesterol
Gander	Pearson Correlation	1	-.169	-.011	-.039	-.302	-.311	.037
	Sig. (2-tailed)		.326	.948	.823	.073	.065	.830
Age	Pearson Correlation	-.169	1	.404*	-.504**	.105	-.312	.169
	Sig. (2-tailed)	.326		.015	.002	.540	.064	.325
TSH	Pearson Correlation	-.011	.404*	1	-.621**	-.095	-.143	-.116
	Sig. (2-tailed)	.948	.015		.000	.581	.405	.501
T4	Pearson Correlation	-.039	-.504**	-.621**	1	.078	.285	.057
	Sig. (2-tailed)	.823	.002	.000		.649	.092	.741
T3	Pearson Correlation	-.302	.105	-.095	.078	1	.038	.178
	Sig. (2-tailed)	.073	.540	.581	.649		.827	.299
FBS	Pearson Correlation	-.311	-.312	-.143	.285	.038	1	-.162
	Sig. (2-tailed)	.065	.064	.405	.092	.827		.346
Cholesterol	Pearson Correlation	.037	.169	-.116	.057	.178	-.162	1
	Sig. (2-tailed)	.830	.325	.501	.741	.299	.346	

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

**. Correlation consider significant at the 0.01 level (2-tailed).