

Prevalence of thyroid dysfunction and thyroid auto antibodies in type 2 diabetic patients

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ABSTRACT

Objective: To investigate the relationship between thyroid dysfunction and thyroid autoimmunity, and diabetes mellitus (DM).

Methodology: Eight hundred twenty type 2 diabetic patients attending to diabetes clinic of Ahvaz University were screened for T4, T3, T3RU, TSH, HbA1c, Anti-TPO Ab, Anti-TG A. Other variables were sex, age, and blood sugar lowering drugs.

Results: About 20 percent of patients had one type of thyroid dysfunction: subclinical or clinical hypothyroidism and subclinical to overt hyperthyroidism which had significant relationship with sex ($P = 0.003$) but not with age ($P = 0.141$). High levels of Anti-Tpo Ab and Anti-TG Ab were seen in 33.9% and 32.7% of patients, respectively.

Conclusion: Due to high prevalence of thyroid dysfunction and thyroid autoantibodies in patients with type 2 diabetes, we suggest all patients with type 2 diabetes should undergo annual screening by serum TSH measurement.

KEY WORDS: Diabetes mellitus type 2; Thyroid auto-antibody; Thyroid dysfunction.

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INTRODUCTION

Diabetes is a disorder characterized by increased blood sugar due to insufficient insulin production by pancreas or insulin resistance. Diabetes and thyroid disorders are both due to disturbances in endocrine system functions which are contributed

to body metabolism. Insulin and thyroid hormones contribute in cell metabolism together; any increase or decrease in each of them can impair the function of the other.¹ Studies have shown that diabetes and thyroid diseases intend to occur together. Thyroid disorders are common in type 2 diabetes because both of them intend to occur more in elderly. Thyroid disorders can act as a great obstacle in controlling blood sugar in diabetics. Hypothyroidism can decrease the amount of insulin required in diabetics and hyperthyroidism can deteriorate glucose tolerance or glucose control.²

Undiagnosed hypothyroidism induces recurrent attacks of hypoglycemia because synthesis and release of insulin is decreased³ and due to reduced gluconeogenesis⁴ the rate of glucose release from liver is also decreased and consequently, control of body metabolism is affected. In hyperthyroidism, intestinal absorption and glycogenolysis are increased and hyperglycemia can occur.⁵ In contrast to hypothyroidism, hyperthyroidism is associated with increased release of growth hormone and glucocorticoids, and thereby can affect glucose homeostasis.^{4,6}

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Thyroid disorders may be undiagnosed in diabetics because their common signs and symptoms are similar to those of diabetes itself. Uncontrolled diabetes, either type 1 or type 2, may induce a low T3 so that total T3 and free T3 will decrease and reverse T3 will increase but TSH and T4 will stay normal.⁷ In some studies, the prevalence of thyroid disorders in type 2 diabetes has been reported from 12.5% to 19%.⁸⁻¹¹ Because of high prevalence of thyroid disorders in type 2 diabetes, we designed a study to assess thyroid dysfunction and thyroid auto-antibodies in type 2 diabetic patients referred to the diabetes clinic of Golestan hospital in Ahvaz.

METHODOLOGY

This descriptive study was performed on 820 type 2 patients attending diabetes clinic of Golestan hospital in Ahvaz from 2005 to 2007. Demographic information of patients is shown in Table-I. A questionnaire containing variables of sex, age, type of diabetes and type of drug consumed was completed for all patients.

T4, T3 and T3RU levels in fasting blood specimens were measured by Gama-counter instrument (LKB-Wallak Clinic Gama 1270 company - Finland) using Immunotheck kit and RIA method and TSH with IRMA method and HbA1c level by HbGold instrument using Liquid Chromatography method, and Anti-Tpo and Anti-TG levels measured by the above mentioned Gama-counter and the same Kit and the RIA method. The obtained data were analyzed using chi-square, t-test or ANOVA.

RESULTS

The patients were 306 males and 514 females with mean age of 49.8 ± 11.4 years. (Table-I) In the studied group, 167 patients (20.4%) had thyroid dysfunction including 7.8% subclinical hypothyroidism, 5.5% hypothyroidism, 5.2% subclinical hyperthyroidism and 1.8% hyperthyroidism. Absolute and relative frequency distributions of thyroid functional status in diabetic patients according to sex are shown in Table-II. The prevalence of thyroid dysfunction was 23.5% among females and 15% among males. ($p = 0.003$)

No significant relationship was found between the thyroid dysfunction and the age of the patients. ($p = 0.141$) In addition, no significant relationship was detected between the thyroid dysfunction and the type of consumed blood glucose lowering. ($p = 0.559$). High levels of Anti-Tpo Ab and Anti-TG Ab were seen in 33.9% and 32.7% of patients, respectively, but no significant relationship was found with sex. No significant relationship was found between the thyroid dysfunction and the HbA1c.

DISCUSSION

Thyroid dysfunction was detected in 20.4% of the participants in this study which is higher than other reported studies. Thyroid disorders are common in general population and their relative frequency is estimated to be 6.6 to 11.7 percent.¹²⁻¹⁴ On the other hand there is a known relationship between thyroid disease and diabetes, and diabetic patients

Table-I: Absolute and relative frequency of demographic variables of the studied patients.

Name	Variable		Frequency	
	Categories	No. (of Patients)	Percent	
Sex	Male	514	62.7	
	Female	306	37.3	
	Total	820	100	
Age (per year)	< 30	31	3.8	
	30-39	131	16	
	40-49	280	34.2	
	50-59	220	26.9	
	> = 60	157	19.2	
	Total	820	100	
Consumed blood lowering drug	Metformin	142	17.3	
	Sulfonylurea	314	38.3	
	Insulin	115	14	
	Combined drugs	249	30.4	
	Total	820	100	

Table-II: Absolute and relative frequency distributions of thyroid functional status in diabetic patients according to sex.

<u>Thyroid status</u> <u>Sex</u>	<u>Hyperthyroidism</u>	<u>Hypothyroidism</u>	<u>Subclinical</u> <u>Hypothyroidism</u>	<u>Subclinical</u> <u>Hyperthyroidism</u>	<u>Normal</u>	<u>Total</u>
Males	8 (2.6%) ¹	12 (3.9%)	15 (4.9%)	11 (3.6%)	260 (85%)	306 (100%)
Females	7 (1.4%)	33 (6.4%)	49 (9.5%)	32 (6.2%)	393 (76.5%)	514 (100%)
Both sexes	15 (2%)	45 (5%)	64 (8%)	43 (5%)	653 (80%)	820 (100%)

¹ Numbers in parenthesis indicate row percents.

have higher prevalence of thyroid involvement.¹⁵⁻¹⁹ In Radaidah et al study in Jordan on 908 type 2 diabetic patients thyroid dysfunction was 12.5%.⁸ Nobre EL et al reported 12.7% thyroid dysfunction in Portuguese type 2 patients.¹¹ It was 16% in Achar DH et al study in Saudi Arabia.⁹

Matej Kova et al reported thyroid dysfunction in 19% of type 2 DM patients. The differences of the results of these studies can be due to differences in sample sizes, differences in race, geographic area, age and sex. The higher percentage in our study compared to most other studies can be explained by previous presence of iodine deficiency in Iran which was modified by using iodinated salt that may lead to increased prevalence of autoimmune thyroid disease.²⁰⁻²² In the present study, the prevalence of thyroid dysfunction were 7.8% subclinical hypothyroidism, 5.5% hypothyroidism, 5.2% subclinical hyperthyroidism and 1.8% hyperthyroidism, respectively, which have been confirmed in previous studies, too.^{9,11,18} There was an obvious association between sex and thyroid dysfunction (23.5% of females v. 15% of males [$p = 0,003$]) which is in accordance with other studies.^{11,18,19}

In this study, no significant relationship was found between the age of the patients and thyroid dysfunction ($p = 0.141$) while it has been shown in some other studies.¹¹ Some probable reasons for this difference are different sample sizes, and differences in race, sex and age of the subjects studied. No significant relationship was found between type of blood glucose lowering drug consumed (Sulfonylurea, Metformin, Insulin and Compound Drugs) and thyroid dysfunction. ($p = 0.559$)

No significant relationship was detected between HbA1c level and thyroid dysfunction which was similar to other studies.¹¹ In this study, the percentage of anti-thyroid antibodies (Anti-Tpo, Anti-TG) were 33.9% and 32.7%, respectively, which were higher than other studies.^{8,9} This issue can be due to differences in race, geographic area, sex and age of the subjects studied, or consumption of iodine

salts in Iran which can lead to autoimmune thyroid diseases.²⁰⁻²² Of course, the higher percentage was found in females. In this study we didn't assess the effect of thyroid dysfunction on lipid profile and relation of such disorders with late complications of diabetes mellitus. Future studies should be designed to address such entities.

CONCLUSION

The results indicate that thyroid dysfunctions are of high prevalence (20.4%) in type 2 diabetes particularly in females. High prevalence of anti-thyroid antibodies in type 2 diabetes indicated the probable occurrence of future thyroid dysfunction in these patients. Therefore, it is necessary to screen type 2 diabetes patients especially females for thyroid dysfunctions at least by annual TSH measurement.

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