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Research Article

PREVALENCE OF THYROID DISEASE AMONG TYPE 2 DIABETIC PATIENTS IN TABUK CITY, SAUDI ARABIA

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Abstract:

Introduction: Diabetes mellitus is the commonest chronic endocrine disorder, and it has a large impact on our society. Thyroid disorders are also very common in the general population and are second only to diabetes as the most common condition to affect the endocrine system. Objective: To identify the prevalence of thyroid dysfunction in diabetics and to see the correlation between thyroid profile and diabetes mellitus. Materials and Methods:

A cross-sectional study was done over 367 types 2 diabetic patients by measuring the correlation between HbA1c, TSH, T4, T3. Result: Based on thyroid profile parameters thyroid disease was diagnosed in 95 (25.27%) patients. Hypothyroidism, Hyperthyroidism, Subclinical hyper & hypothyroidism was significantly higher among patients with HbA1C level >8. (p-value=0.045). Conclusion: The prevalence of thyroid diseases, either clinical or subclinical among diabetic patients are high. Among diabetic subjects, the commonest was subclinical hypothyroidism. Older patients and those with higher HbA1c (uncontrolled diabetic) were more likely to have thyroid dysfunction.

Keywords: type 2 diabetes, Thyroid dysfunction, a prevalence

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INTRODUCTION:

The term diabetes mellitus describes several diseases of abnormal carbohydrate metabolism that are characterized by hyperglycemia. It is associated with a relative or absolute impairment in insulin secretion, along with varying degrees of peripheral resistance to the action of insulin. (1)

Diabetes mellitus is the commonest chronic endocrine disorder, and it has a large impact on society, in industrialized Western countries, Asia, Africa, Central America, and South America, affecting an estimated 5% to 10% of the adult population. (2)

Diabetes is common among Saudis as there were 3.4 million cases of diabetes in Saudi Arabia in 2015. (3) Thyroid disorders are also very common in the general population and are second only to diabetes as the most common condition to affect the endocrine system. As a result, it is common for an individual to be affected by both thyroid diseases and diabetes. The first report showing the association between diabetes and thyroid dysfunction was published in 1979. Since then, many studies in different countries have tried to estimate the prevalence of thyroid dysfunction among type 2 diabetic patients. (4)

The prevalence of thyroid dysfunction among Saudi diabetic patients was reported to be 16% as opposed to 7% in nondiabetics. (5)

One study was done that found the prevalence of thyroid dysfunction in diabetic patients was 21.5%. (6)

Our study was done to identify the prevalence of thyroid dysfunction in diabetics and to see the correlation between thyroid profile and diabetes mellitus and to emphasize the importance of screening of thyroid function test in all diabetic patients.

Materials and Methods:

This cross-sectional study comprises 376 out of 377 diabetic patients. One patient did not give a blood sample as a missed appointment. Conducted in Endocrine clinics of King Salman army force hospital at Tabuk city in Saudi Arabia. The inclusion criteria which are: patient documented to have type 2 DM, follow up in king Salman army force hospital. The exclusion criteria are all types of diabetes other than type 2, thyroidectomy, pituitary adenoma.

We took written approval from participants of our study. We took blood samples from them to check thyroid functions and HbA1C, then reviewed the electronic file to assessed their lab results.

The duration of data collection was 1 month started on 10 July and ended on 9 August 2018.

Age, sex, HbA1c, TSH, T3, and T4 measurements were collected from each patient.

The lab investigation:

According to our hospital criteria:

If TSH more than 5.5 IU/ML and T3, T4 less than normal we classify it's as hypothyroidism.

If TSH less than 0.3 MIU/ML and T3, T4 more than normal we classify it's as hyperthyroidism.

If TSH more than 5.5 IU/ML and T3, T4 normal we classify it's as subclinical hypothyroidism.

If TSH less than 0.3 MIU/ML and T3, T4 normal we classify it's as subclinical hyperthyroidism.

HbA1c more than or equal 8 %considered uncontrolled diabetes, while less than 8% considered controlled.

T3 lab range is (2.3-4.2) pg/ml, T4 (0.89-1.76) nh/dl.

Statistical analysis:

sampling at 95% confidence interval, 5% margin of error population sizes the result was done by Mann Whitney U Test as the assumption of normality and correlation test on SPSS (software package for social science) p-value of <0.05 was considered for statistical significance.

RESULTS :

In this study, 376 diabetic patients were included. Among these patients 190(50.53%) were male and 186(49.47%) were female. Mean age of patients male and female patients was 56.06 ± 15.05 and 55.71 ± 13.41 years. For male and female patients no significant difference was seen for HbA1c and Thyroid profile (TSH, T3 & T4). (Table-1) The HbA1c level was categorized as controlled and uncontrolled based on the cut of value <8% and >8%. Age and gender of patients had no significant association with HbA1c level. (Table-2)

Based on thyroid profile parameters thyroid disease was diagnosed in 95(25.27%) patients. Among these patients, 19(20%) were diagnosed with hypothyroidism, 4(4.21%) with hyperthyroidism, 60(63.16%) patients with subclinical hypothyroidism and 12(12.63%) patients with subclinical hyperthyroidism. (Figure-1)

Age (p-value=0.040) and HbA1c level (p-value=0.045) was significantly associated with type of thyroid disease. However, the gender of patients had no significant effect on thyroid disease. (p-

value=0.0479) In all age groups frequency of subclinical hypothyroidism was significantly higher

compared to other types of thyroid disease. (Table-3).

Table-1: Demographic and Clinical Characteristics of patients

	Male	Female	p-value
n	190	186	
Age	56.06±15.05	55.71±13.41	-
HbA1C	8.70±1.84	8.68±1.72	0.886 ^(a)
TSH	4.10±6.51	4.01±6.45	0.248 ^(a)
T3	1.45±2.00	2.46±1.25	0.094 ^(a)
T4	2.57±0.81	1.89±6.17	0.248 ^(a)

Note: (a): Mann Whitney U Test as the assumption of normality was not fulfilled

Table-2: HbA1C level in relation Age & Gender of patients

		HbA1C		Total	p-value
		Controlled: <8	Uncontrolled :>8		
Age (Years)	30-40	20(14.3%)	46(19.5%)	66	0.533
	41-50	32(22.9%)	49(20.8%)	81	
	51-60	32(22.9%)	52(22%)	84	
	61-70	27(19.3%)	52(22%)	79	
	>70	29(20.7%)	37(15.7%)	66	
	Total	140(100%)	236(100%)	376	
Gender	Male	72(51.4%)	118(50%)	190	0.789
	Female	68(48.6%)	118(50%)	186	
	Total	140(100%)	236(100%)	376	

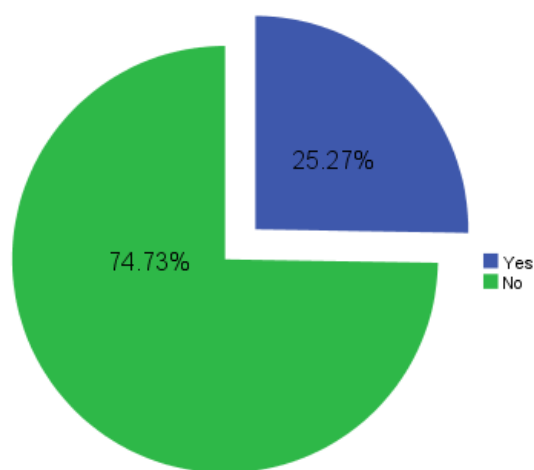


Figure-1: Thyroid Disease in diabetic patients

Table-3: Thyroid Disease in relation to Age, Gender & HbA1C level

	<i>Hypothyroidism</i>	<i>Hyperthyroidism</i>	<i>Subclinical Hypothyroidism</i>	<i>Subclinical Hyperthyroidism</i>	<i>Total</i>	<i>p-value</i>
<i>Age(Years)</i>						
<i>30-40</i>	1(5.6%)	1(5.6%)	16(88.9%)	0(0%)	<i>18(100%)</i>	<i>0.040</i>
<i>41-50</i>	4(28.6%)	0(0%)	6(42.9%)	4(28.6%)	<i>14(100%)</i>	
<i>51-60</i>	3(14.3%)	3(14.3%)	12(57.1%)	3(14.3%)	<i>21(100%)</i>	
<i>61-70</i>	7(35%)	0(0%)	10(50%)	3(15%)	<i>20(100%)</i>	
<i>>70</i>	4(18.2%)	0(0%)	16(72.7%)	2(9.1%)	<i>22(100%)</i>	
<i>Total</i>	<i>19</i>	<i>4</i>	<i>60</i>	<i>12</i>	<i>95(100%)</i>	
<i>Gender</i>						
<i>Male</i>	13(22.8%)	2(3.5%)	37(64.9%)	5(8.8%)	<i>57(100%)</i>	<i>0.479</i>
<i>Female</i>	6(15.8%)	2(5.3%)	23(60.5%)	7(18.4%)	<i>38(100%)</i>	
<i>Total</i>	<i>19</i>	<i>4</i>	<i>60</i>	<i>12</i>	<i>95(100%)</i>	
<i>HBA1C</i>						
<i><8</i>	13(33.3%)	1(2.6%)	22(56.4%)	3(7.7%)	<i>39(100%)</i>	<i>0.045</i>
<i>>8</i>	6(10.7%)	3(5.4%)	38(67.9%)	9(16.1%)	<i>56(100%)</i>	
<i>Total</i>	<i>19</i>	<i>4</i>	<i>60</i>	<i>12</i>	<i>95(100%)</i>	

DISCUSSION:

It is important to screen patients with diabetes regarding thyroid disorders as the existence of both problems together can worsen the health status of patients more than the presence of only one of them. (7) Diagnosis of thyroid disorders among diabetic patients is usually very difficult depending on clinical symptoms and signs as poor glycemic control can lead to manifestations mimic those of hyperthyroidism like fatigue and loss of weight despite increased appetite. Additionally, advanced cases of diabetic nephropathy can also present with symptoms and signs similar to hypothyroidism because patients may have fatigue, pallor, edema and weight gain. (8) Thus, it is essential to assess thyroid disorders in diabetic patients. the present study was therefore done to identify the prevalence of thyroid dysfunction in diabetic patients and to see the correlation between thyroid profile and diabetes mellitus and to emphasize the importance of screening of thyroid function test in all diabetic patients.

In the present study, the prevalence of thyroid diseases among diabetic patients which was 25.27%. A closed figure has been reported in India with 21.5%. (6) However; a higher figure was reported by Makandar et al (2015) in India also 32%. (8) Vergara Palma, et al reported a lower rate of 14.7% in Brazil. (9)

Among our patients, 20% were hypothyroidism, 4.2% were hyperthyroidism, most of them 63.2% had subclinical hypothyroidism and 12.6% had subclinical hyperthyroidism. In accordance with findings of the present study, numerous studies have identified that hypothyroidism is more predominant

over hyperthyroidism and subclinical hypothyroidism predominant overall. (7) (14)

Age was not associated with a type of thyroid disease, where all patients age groups were more likely to have subclinical hypothyroidism.

In this study, HbA1c level was significantly associated with the type of thyroid disease. Patients with HbA1c >8 were more likely to have subclinical hypothyroidism 63.3 %. In other studies, (6), (9), (15) the prevalence of thyroid disorder was reported more significantly in patients with HbA1c ≥ 7 as compared to patients with HbA1c < 7.

In the current survey, the gender of patients had no significant effect on thyroid disease. However, others reported that male diabetic patients were more likely to have thyroid dysfunction compared to females. (6), (16)

In against with what has been reported by Shanmugam S, et al (2015), (6) HbA1c level in our study is directly correlated with levels of thyroid hormones (T3, T4, TSH). Some studies attributed the presence of abnormal levels of thyroid hormones among diabetics to diabetic medications as insulin increases the levels of T4 and suppresses the levels of T3 by inhibiting the hepatic conversion of T4 to T3. Sulfonylureas are proved to suppress the levels of T4 and raise the level of TSH. Sulfonylurea may lead to an increased incidence of hypothyroidism. (7), (14)

There were certain limitations of the present study .1- cross-sectional design which did not permit the temporal relation between the dependent variable from one side and independent variables from the

other side. 2-Conduction of the study in one healthcare facility could impact the results .3- finally, some important factors were not investigated in this study such as duration of diabetes, medications and family history of thyroid diseases.

In conclusion, the prevalence of thyroid diseases, either clinical or subclinical is high among diabetic subjects. The commonest was subclinical hypothyroidism. Older patients and those with higher HbA1c were more likely to have thyroid dysfunction. Considering the results of the present study, we recommend

All diabetic patients should have a routine screening of thyroid dysfunction especially with older age group patients and those who are poorly controlled diabetics.

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