International Journal of Medical Science and Clinical Invention 5(01): 3400-3403, 2018
DOI:10.18535/ijmsci/v5i1.04 **ICV 2016: 77.2**
e-ISSN:2348-991X, p-ISSN: 2454-9576

Research Article

Incidence of Thyroid Diseases in Saudi Diabetic Patients by Means of Ultrasonography

Naglaa Mostafa Elsayed, Mnah Hakami, Bashayer Al-Sulami, Anwar Al-Sulami

Professor of diagnostic radiology, faculty of applied medical sciences, KAU and Assistant profess
King Abdulaziz university and Cairo university

Abstract:

Introduction: Both thyroid diseases and diabetes mellitus (DM) are common in medical practice in Saudi Arabia. This research was done to study the possible relation between these two diseases.

Materials and Methods: A prospective case control study was carried out to assess thyroid abnormalities by Ultrasound (US) in diabetic patients (type 1 and type 2).The study population consisted of 69 diabetic patients (20 Type 1DM and 49 Type 2DM) and 111 non diabetic patients. Thyroid US was done for all participants and thyroid function test mainly thyroid stimulating hormone (TSH) was done for all cases that showed positive US changes for thyroid abnormalities.

Results: Abnormal thyroid US was detected in 66.7% of diabetic and 34.2% of non diabetic participants. Multinodular goitre (MNG) was the most common disorder in both types of DM (78.6% in DMT1 and 56.3% in DMT2), while thyroid nodules were the least common disorder. No significant difference between diabetic and non diabetic patients in TSH results.

Conclusion and Recommendations: The present study showed high prevalence of thyroid disorder in diabetic patients. We recommend routine US for all diabetic patients especially those with long term diabetes, uncontrolled diabetes or complaining of symptoms of thyroid dysfunction.

INTRODUCTION

Many studies found a relation between thyroid diseases and both types of diabetes mellitus. [1][2][3][4] For the time being, the pathophysiological basis of the relationship between both diseases has been better explained. It rests on a complicated interaction of mutual signaling pathways and on a linked genetic susceptibility in type 1 of diabetes.[5]

Methodology

Study plan

A prospective case control study was carried out to assess thyroid abnormalities by Ultrasound in diabetic patients (type 1 and type 2), and to study the possible relation between these two diseases. An ethical approval was obtained from the research ethics committee, and a written consent was taken from all participants.

Subjects:

Our participants included 69 diabetic patients (62 female and 7 male) (20 with type 1DM and 49 with type 2 DM); ranging in age from 17 to 70 years, with the median age is 43 years, in addition to 111 participants with normal glucose levels matching in age and sex with the patients as control.

Collected data included, past and present medical history related to the duration and type of diabetes, and symptoms suggestive of hypo or hyperthyroidism. The level of serum TSH was done for all US positive cases for thyroid abnormalities.

Ultrasound technique:

Philips IU22 and Phillips HD3 Ultrasound machines with high frequency linear-array transducer (5-9 MHz – 5-12 MHz) were used for examination. The examination was performed according to The American Institute of Ultrasound in Medicine (AIUM)

Statistical analysis:

Patients were divided into two categories; diabetic and non-diabetic. Categorical variables were presented by number and percent. Chi-square or Fischer's exact test were done to present the association between diabetes mellitus and other parameters. Odds ratio(s) (OR) with 95% confidence interval (CI) were calculated. Odds ratio is index that calculated to assess the possibility of occurrence of an event in presence of certain risk. T-test was done to compare the BMI in the two groups. In all statistical test, when the p value was less than 0.05 it considered significant.

Results

Diabetes is more prevalent in females than males (89.9% and

10.1% respectively). The incidence of diabetes in older age groups is higher than others (P value <0.01) (figure 1).

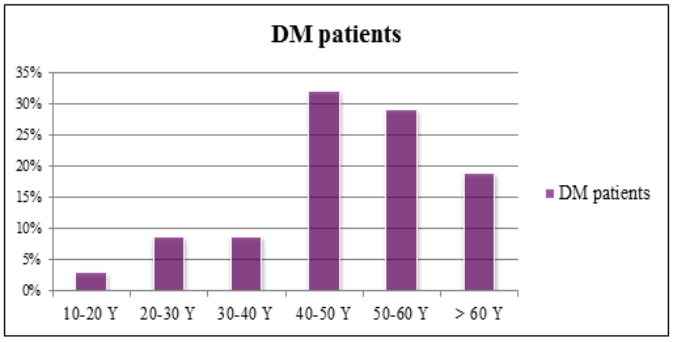


Figure 1: The percentage of DM patients in each age group.

Comparing T1DM and T2DM according to the age, the prevalence of T1DM is equal in 20-30, 30-40, 40-50 years age groups (25% each), while T2DM is more prevalent in age group 50-60 years (38.8%). (Figure 2).

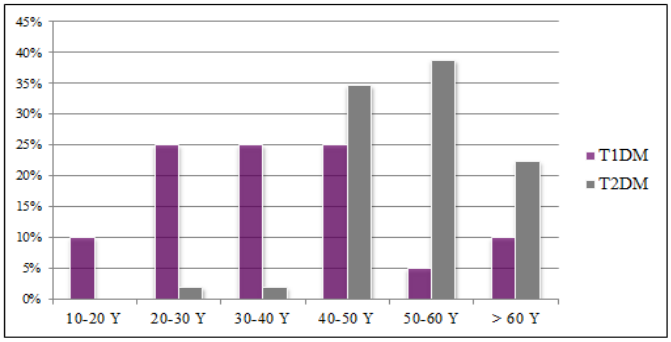


Figure 2: Diabetes type vs. participants' age.

Diabetic patients – by its both types- experienced, weakness, fatigue, arrhythmia, irritability, falling hair, HTN, GI symptoms, weight loss more than non-diabetics.

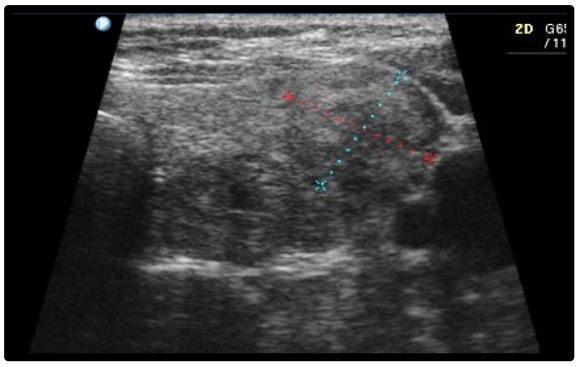
The onset of DM in 53.6% of diabetic patients is more than 10 years ago. The percentage of diabetic patients who had good glycemic control is 50.7%.

The percentage of the participants who showed abnormal thyroid US is 66.7% of diabetics and 34.2% of non-diabetics (Table 1) with P <0.01, OR 3.8 (95% CI 2.0-7.3). This means that diabetic patients show increased risk of thyroid abnormalities 3.8 times more than non-diabetics. No significant differences in the incidence of thyroid disorders between Type 1 and 2 which was (70%, 65.3%) respectively.

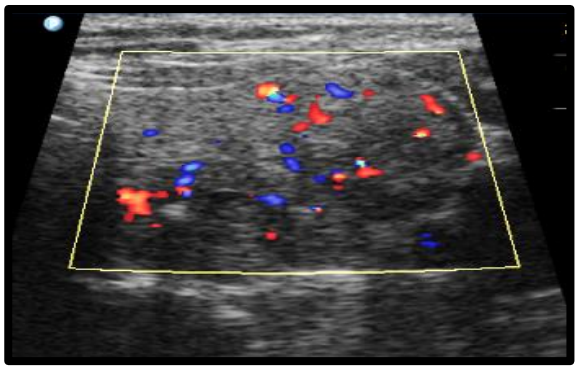
			Diabetic patient		Total
			N	Y	
Groups	case	Count	38	46	84
		% within Diabetic patient	34.2%	66.7%	46.7%
	control	Count	73	23	96
		% within Diabetic patient	65.8%	33.3%	53.3%
Total		Count	111	69	180
		% within Diabetic patient	100.0%	100.0%	100.0%

Table 1: The incidence of thyroid disorders in diabetic and non-diabetic participants.

Multi Nodular Goitre (MNG), cysts, thyroiditis and nodules among diabetic patients were 63.0%, 19.6%, 13.0% and 4.3%, respectively (Figures 3,4 and 5).

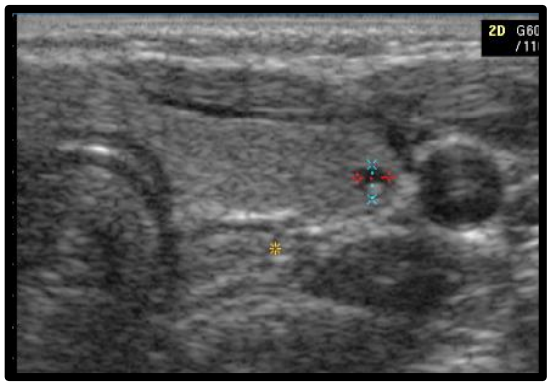


A

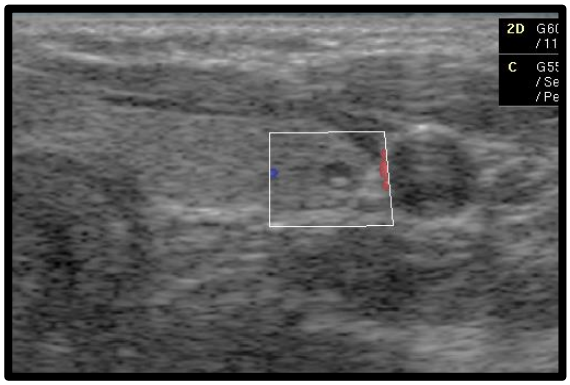


B

Figure 3: A: US B: Colour Doppler showing multiple , variable sized hypo and isoechoic nodules (MNG)

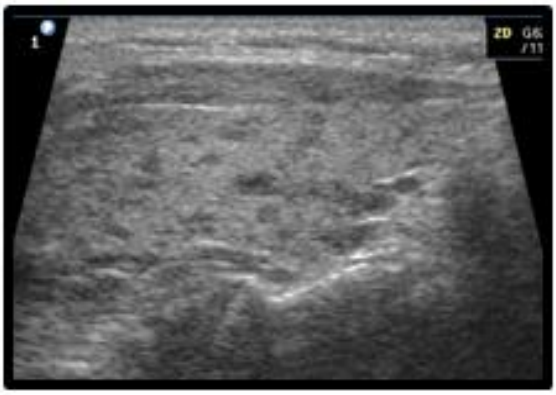


A

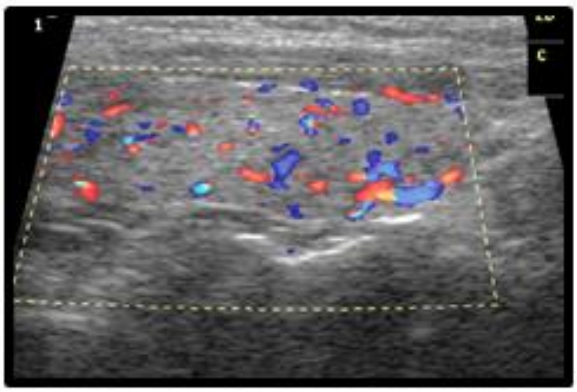


B

Figure 4: A: US B: Colour Doppler showing subcentimetric cyst at the right thyroid lobe.



A



B

Figure 5: A: US B: Color Doppler showing heterogeneous echogenicity of the thyroid gland with increased vascularity denoting thyrodidtis.

There is no statistically significant difference between diabetic and non-diabetic patients in thyroid abnormalities (P value= 0.14) (Figure 6).

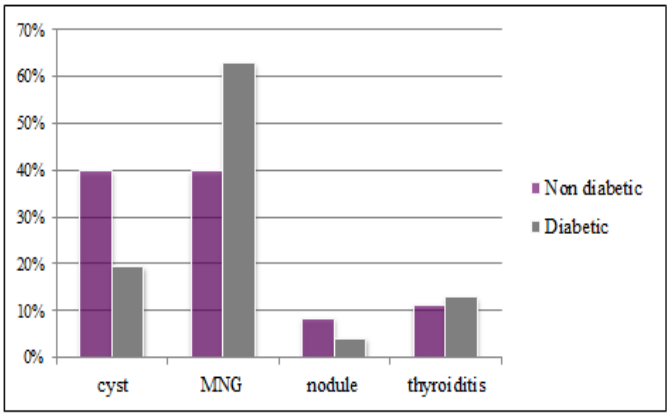


Figure 6: Thyroid disorders in diabetic and non-diabetic participants.

The most common disorder in T1DM patients was goitre 78.6% followed by thyroiditis 14.3% then cysts 7.1%, while in T2DM patients, goitre represents 56.3% followed by cyst 25% then thyroiditis 12.5%. Thyroid nodules were seen only in T2DM (6.3%). the P value was 0.35. So, there is no significant difference between T1DM and T2DM regarding thyroid disorder (Figure 8).

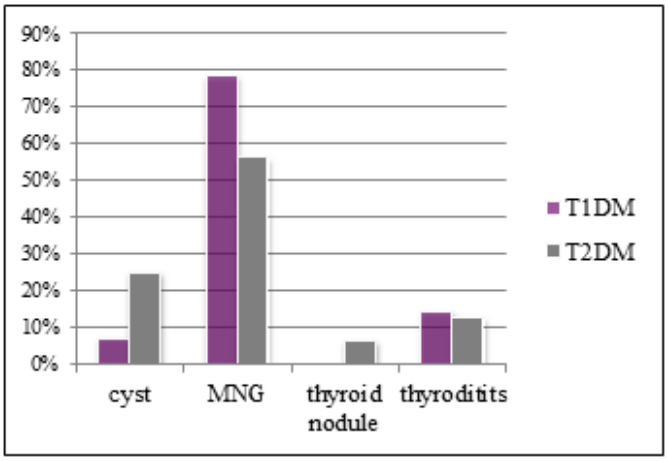


Figure 8: Multiple parameters histogram showing thyroid disorders in type1 and type2 diabetic participants.

Serum TSH was done to 33 out of 69 diabetic patients (25 of them with T2DM and 8 with T1DM). According to tables 2 and 3 there is no significant difference in the level of TSH between diabetic and non-diabetic participant or between both types of DM.

	Non-diabetic	Diabetic
Normal Function Test	25 participants 71.4%	25 participants 78.1%
High Function Test	3 participants 8.6%	3 participants 9.4%
Low Function Test	7 participants 20%	4 participants 12.5%
Total	35 participants 31.5%	33 participants 47.8%

Table 2: TSH results in diabetic and non-diabetic participants.

	T1DM	T2DM
Normal Function Test	7 participants 87.5%	18 participants 75%
High Function Test	0 participant 0%	3 participants 12.5%
Low Function Test	1 participant 12.5%	3 participants 12.5%
Total	8 participants 40%	25 participants 51%

Table 3: TSH results in T1DM and T2DM participants.

Discussion:

Thyroid diseases and diabetes are among the commonest endocrine disorders in Saudi Arabia [6][7]. In the current research, the percentage of the participants who showed abnormal thyroid US is 66.7% of diabetics and 34.2% of non-diabetics with P <0.01, OR 3.8 (95% CI 2.0-7.3), meaning that the risk of thyroid abnormalities in diabetics is 3.8 times more than non-diabetics. No significant difference between the incidence of thyroid abnormalities in both type 1 and type 2 diabetics (70% and 66.3% respectively) meaning that there is a strong correlation between thyroid abnormalities and

diabetes regardless its type. The commonest thyroid abnormality in our study is MNG followed by thyroid cyst then thyroiditis, while the least common is solitary thyroid nodule. Thyroiditis is more prevalent in type1 diabetics than type2. We refer this to the fact that both disorders have common autoimmune basis. This finding is supported and explained by many researchers who proved that autoimmune thyroid disease was the commonest autoimmune disorder related to type1 diabetes. A recent research showed a shared genetic susceptibility to both conditions [15]. Diabetes is an autoimmune disorder which has increase tendency to react against specific antigens or either disability to obtain tolerance to some auto antigen or specific common antigens present in the tissues of individuals prone to autoimmune diseases. This may explain the high incidence of some autoimmune disorders in diabetic patients. The pathogenetic mechanism that responsible for the occurrence of autoimmune diseases has not been clearly explained, but some evidences show that common genetic determinants mainly human leukocyte antigen risk alleles or CTLA4 gene and PTPN22 gene could play a role [9]. Moreover, type 1 diabetes often gets along with other autoimmune thyroid disorders such as Graves' disease and Hashimoto's thyroiditis [10]. Thyroid cysts, nodules and MNG are more common in type 2 diabetics. These findings were also proved in a study of R. Junik et al (2006) who found nodular thyroid and goitre to be more frequent in type two diabetic patients [10]. There is no significant difference between diabetic and non-diabetic participants in the thyroid function tests. The incidence of abnormal TSH in our diabetic participants is 21.9%. These finding is supported by R. Junik et al (2006) study [10, 11, 12].

Although these abnormal thyroid functions are more in type 2 than type 1 in the current research (25%: 12.5% respectively), yet it is not statistically significant. Thyroid dysfunctions are proved to be more common in type 2 than in type 1 diabetic patients in many studies [13][14].

The originality in the current study is that it studies the correlation between DM and thyroid disorders by both US and thyroid function tests. US could detect structural thyroid abnormalities which included from just insignificant simple cysts up to suspicious thyroid nodules, which were not found in most previous researches. Thyroid nodules, thyroiditis and active nodule among MNG gland may be associated with abnormal thyroid, while simple cysts don't show any clinical significance.[15]

CONCLUSION AND RECOMINDATIONS:

Thyroid diseases are common among diabetic patients. A total of 66.7% of our diabetic participants have thyroid abnormalities. Based on US findings, the risk of thyroid abnormalities in diabetics is 3.8 times more in non-diabetics. However, there is no significant difference in the incidence of thyroid disorders between T1DM and T2DM. The most common thyroid disease in both types is MNG.

We recommend screening for thyroid diseases among diabetic patients by both US - to detect important structural abnormalities like thyroid nodules- , and laboratory analysis of the thyroid hormones to detect abnormal functions which could be associated with risk factors such as dyslipidemia and hypertension.

REFERENCES

1- Hage M, Zantout MS, Azar ST. (2011) Thyroid disorders and diabetes mellitus. J Thyroid Res. 2011, 439-463.

2- Johnson JL.(2006). Diabetes control in thyroid disease. Diabetes Spectr. 19(3), 148- 153.

3- Radetti G, Paganini C, Gentili L, et al. (1995). Frequency of Hashimoto's thyroiditis in children with type 1 diabetes mellitus. Acta Diabetol. 32(2), 121‑124.

4- Burek CL, Rose NR, Guire KE, et al. (1990).Thyroid autoantibodies in black and in white children and adolescents with type 1 diabetes mellitus and their first degree relatives. Autoimmunity 7(2-3), 157‑167.

5- Leonidas H. Duntas, Jacques Orgiazzi, et al.(2011). The interface between thyroid and diabetes mellitus. Clinical Endocrinology. 75(1), 1–9.

6- Al Dawish MA, Robert AA1, Braham R, et al. (2015). Diabetes Mellitus in Saudi Arabia: A Review of the Recent Literature. Curr Diabetes Rev. [Epub ahead of print].

7- Safia Moussa, Amal Alshammari , Gada Alshammari , et al. (2016). Pattern of Thyroid Disease in Hail Region, Saudi Arabia. International Journal of Science and Research. 5(2), 267-282.

8- B. I. Joffe and L. A. Distiller. (2014). Diabetes mellitus and hypothyroidism: strange bedfellows or mutual companions?. WorldJournal of Diabetes. 5(6), 901–904.

9- Vaidya B, Pearce S. (2004). The emerging role of the CTLA-4 gene in autoimmune endocrinopathies. Eur J Endocrinol.150(5), 619-926.

10-Junik R, Kozinski M, Debska-Kozinska K.(2006). Thyroid ultrasound in diabetic patients without overt thyroid disease. Acta Radiol. 47(7), 687–691.

11-Celani MF, Bonati ME, Stucci N. (1994). Prevalence of abnormal thyrotropin concentrations measured by a sensitive assay in patients with type 2 diabetes mellitus. Diabetes Res. 27(1), 15–25.

12-Udiong CEJ, Udoh AE, Etukudoh ME. (2007). Evaluation of thyroid function in diabetes mellitus in Calabar, Nigeria. Indian J Clin Biochem. 22(2), 74–78.

13-Saroj Khatiwada, Rajendra KC, Santosh Kumar Sah, et al. (2015). Thyroid Dysfunction and Associated Risk Factors among Nepalese Diabetes Mellitus Patients. International Journal of Endocrinology. 2015(5 pages).

14- O. Kordonouri, N. Charpentier, and R. Hartmann. (2011). GADA positivity at onset of type 1 diabetes is a risk factor for the development of autoimmune thyroiditis. Pediatric Diabetes. 12(1) ,31–33.

15-Bryan R. Haugen, Erik K. Alexander, Keith C. Bible, Gerard M. Doherty, Susan J. Mandel, Yuri E. Nikiforov, et al. (2016). American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid. 26(1), 1-133.