Asymptomatic Thyroid Disorders In Type 1 Insulin Dependent Diabetes Mellites of Childhood

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Abstract

Objective: The type 1 insulin dependent diabetes mellitus (T1DM) and thyroid dysfunctions are common endocrine disorder and each condition affect the others, The associations between these two conditions are well documented, (T1DM) patients are prone to thyroid disorders for different causes . we aim in this study to evaluate thyroid disorder among children with T1DM .

Methods : A hospital based case control study conducted in the clinic of endocrine disorders in Alzahra Teaching Hospital for the period between 1st of May 2012 to 31th of January 2013. Fifty patients with type 1 insulin dependent diabetes mellitus (T1 IDDM) consists of group A. The control group (group B)consist of Fifty healthy children . Serum level of TSH,T3,T4 were measured by using Minividas for both groups .

***Results*:** Patients aged 5-11 years, Boys were 27 and girls 23 .The mean age of patients was 7.2±1.53 years. The Mean concentrations of TSH were 4.05 ± 1.98 mlU/L in the patients with type 1 diabetic and this is significantly higher than the control group 2.29±0.87 mlU/L with Statistically significant difference ($p < 0.008$). Whereas mean concentrations of TT3 were 1.82 ± 0.35mlU/L in group A and 2.16±0.43 mlU/L in group B this result is significantly lower than the control group with Statistically significant difference ($p < 0.01$) .while there was no significant difference in TT4 values between the type 1 diabetic patients 103.38±8.4 mlU/L and control group 109.70±6.72 mlU/L with($p=0.15$)

Conclusion: This study shows Thyroid disorder is common in type 1 diabetic children. Periodic estimation of TSH and a lesser degree TT3 is important for early detection of thyroid disorder in T1DM patients before appearance of any clinical signs of thyroid disease.

key wards: Thyroid disorder, type 1 diabetes mellitus,T1DM

اضطرابات الغدة الدرقية قبل ظهور الأعراض السريرية

لدى مرضى داء السكري النوع الأول المعتمد على الأنسولين عند الأطفال

الخلاصة

خلفية البحث : داء السكري عند الأطفال (من النوع الأول و المعتمد على الأنسولين) واضطرابا ت الغدة الدرقية من أمراض الغدد الصماء الشائعة وكلاهما يؤثر على الأخر والعلاقة بينهما موثقة بشكل كبير , مرضى داء السكري معرضون إلى اضطرابات الغدة الدرقية لعدة أسباب .

هدف البحث: سيتم في هذا البحث تقييم فحص وظائف الغدة الدرقية لدى مرضى داء السكري(من النوع الأول و المعتمد على الأنسولين).

طرق البحث: تم إجراء دراسة (من نمط الحالات والشواهد) في عيادة أمراض الغدد الصماء في مستشفى الزهراء التعليمي للفترة من الأول من أيار ٢٠١٢ ولغاية نهاية كانون الثاني ٢٠١٣ . شملت الدراسة ٥٠ مريض (مصابا بداء السكري من النوع الأول و المعتمد على الأنسولين) وقد مثلوا المجموعة (أ) . ضمت ل المجموعة الضابطة ٥٠ طفلا من الأصحاء مثلوا المجموعة(ب), تم تحديد

تراكيز هرمونات الغدة الدرقية(T3,T4) وكذلك هرمون الغدة النخامية المحفز للغدة الدرقية (TSH)في مصل الدم بواسطة جهاز Minividas لدى كلتا المجموعتين

النتائج : تراوحت أعمار المرضى بين 4 و15 سنة , المعدل العمري للمرضى كان 7.2±1.53 سنة ,منهم (27) ذكرا, (23) أنثى . أظهرت الدراسة ارتفاع متوسط تركيز هرمون TSH في مصل الدم لدى المجموعة (أ) (4.05 ± 1.98 mIU/L) وهو أعلى مقارنة بالمجموعة (ب) (2.29±0.87 mIU/L). وكانت النتائج ذات معنوية احصائية هامة بقيمة اقل (p <0.008) بلغ متوسط تركيز هرمون T3 في مصل الدم للمجموعة (أ) (0.35mIU/L ± 1.82) وهو أقل مقارنة بالمجموعة (ب) (2.16±0.43 mIU/L) وكانت النتائج ذات معنوية احصائية هامة بقيمة اقل (p<0.0). لم تظهر الدراسة وجود علاقة احصائية هامة بين متوسط تركيز هرمون T4 بين المجموعتين (p=0.15). حيث كانت نتائج متوسط تركيز هرمونT4 8.4±103.38 (mIU/L) و109.70±6.72 mIU/L للمجموعتين(أ) و(ب) على التوالي.

الاستنتاجات : اضطرابات الغدة الدرقية كثيرة الحدوث بين مرضى داء السكري من النوع الأول المعتمد على الأنسولين

التوصيات: يجب التركيز على الفحص الدوري لتركيز هرمون TSH وبدرجة اقل تركيز هرمون T3 لدى هؤلاء المرضى لتحديد تلك الاضطرابات قبل ظهور الأعراض السريرية.

Introduction

Diabetes mellitus (DM) is characterized by hyperglycemia and glycosuria. The most common type occurring in childhood is type1 DM (DM1), which is caused by autoimmune destruction of the insulin-producing beta cells (islets) of the pancreas leading to permanent insulin deficiency [1].

Thyroid disorders were found to be more common in subjects with T1DM compared to those with T2DM. Long term follow-up suggests that as much as 30% of patients with T1DM developed ATD. Hypothyroidism is present in 4-18% of subjects with T1DM [2]. Hyperthyroidism is much less commonly reported, with a prevalence of 1%, similar to that in the general population. Only a small proportion of these patients, however, acquire clinical hypothyroidism; the interval between diagnosis of diabetes and thyroid disease averages about 5 yr [3]. Periodic palpation of the thyroid gland is indicated in all diabetic children; if the gland feels firm or enlarged, serum measurements of thyroid antibodies and thyroid-stimulating hormone (TSH) should be obtained. A confirmed TSH level of greater than 10mIU/mL indicates existing or incipient thyroid dysfunction that warrants replacement with thyroid hormone. Deceleration in the rate of growth may also be due to thyroid failure and is, in itself, a reason for securing serum measurements of thyroxin and TSH concentrations [4]. Hypothyroidism, a reduced rate of liver glucose production is observed in hypo- thyroidism and accounts for the decrease in insulin requirement in hypothyroid diabetic patients. Recurrent hypoglycemic episodes are the presenting signs for the development of hypothyroidism in patients with T1DM and replacement with thyroid hormones reduced the fluctuations in blood glucose levels [5].

Patients And Methods

A hospital based case control study was conducted at the endocrine clinic at Al-Zahraa Teaching Hospital for a period from May 2012 to January 2013. All patients, controls and their parents gave informed consent. Fifty already diagnosed patients of type 1 diabetes .The control group consist of 50 healthy children.

Exclusion criteria:

1-Very ill patients with complication of diabetes mellitus.

2- Patient suffering from any type of thyroid diseases (hypo and hyperthyroidism).

3- Subjects suffering from acute or recent illness.
4- Subjects receiving any medication influencing thyroid function.
Sample were taken from patients during their attendance to clinic and examine by the hospital laboratory according to its classical standers .

Statistical analysis: Statistical analysis was carried out using the statistical package of SPSS-18. Data were presented in simple measures of frequency, percentage, mean, and standard deviation. The significance was tested using (ANOVA) test for more than two groups. P-value of < 0.05 was considered as statistically significant.

Results

Mean ± SD concentrations of TSH were 4.05 ± 1.98 mlU/L was(raised TSH) and 2.29±0.87 mlU/L (all normal TSH concentrations) in the type 1 diabetic patients and control groups respectively. This result shows Statistically significant difference (p <0.008) . Whereas mean ± SD concentrations of TT3 were 1.82 ± 0.35mlU/L (decreasedTT3) and 2.16±0.43 mlU/L (all normal TT3 concentrations) in the type 1 diabetic patients and control groups respectively. This result shows Statistically significant difference (p <0.01), while there was no significant difference (p=0.15) in TT4 values between the type 1 diabetic patients 103.38±8.4 mlU/L (all normal TT4concentrations) and control group 109.70±6.72 mlU/L (all normal TT4concentrations) .

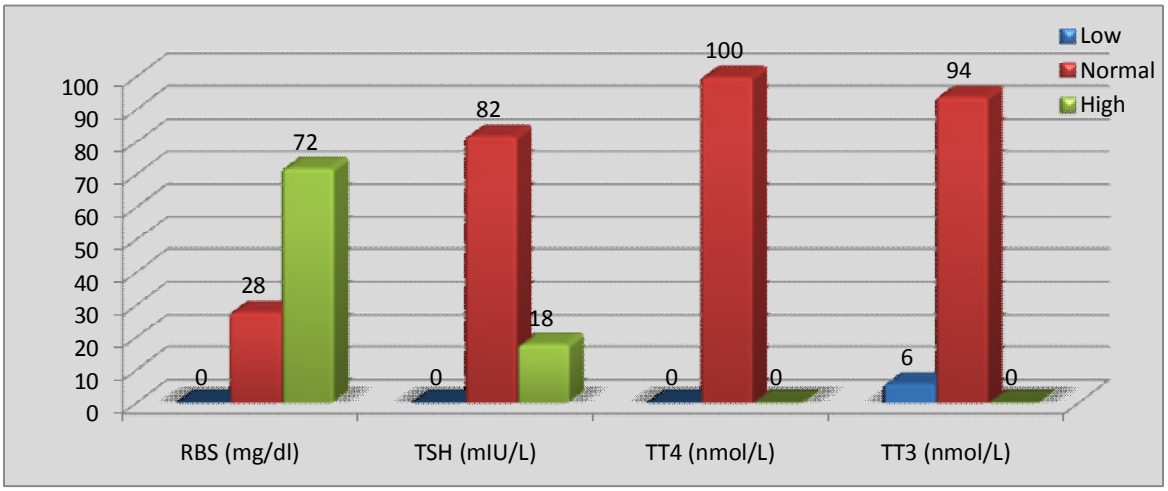

Figure (1) The percentage of RBS, TSH, TT4 and TT3 in patient with T1DM.

Table (1) Distribution of RBS, TSH, TT4 and TT3 in T1DM patients and normal control.

		Diabetics		Controls		Diabetics Patients (Mean±SD)	Control group (Mean±SD)	P value
		No.	%	No.	%			
RBS (mg/dl)	Low	-	-	-	-	166.99±61.78 (88.5-310.0)	92.41±8.15 (78.5-112.0)	0.001**
	Normal < 200	14	28.0	50	100			
	High	36	72.0	-	-			
TSH (mIU/L)	Low	-	-	-	-	4.05 ± 1.98 (0.96 -8.12)	2.29±0.87 (1.0 4.2)	0.008**
	Normal (0.25-5)	41	82.0	50	100			
	High	9	18.0	-	-			
TT4 (nmol/L)	Low	-	-	-	-	103.38±8.4 (88.2-119.8)	109.70±6.72 (93.1-119.9)	0.55
	Normal (60-120)	50	100.0	50	100			
	High	-	-	-	-			
TT3 (nmol/L)	Low	3	6.0	-	-	1.82 ± 0.35 (0.74 -2.78)	2.16 ± 0.43 (1.58-3.19)	0.01*
	Normal (0.92- 2.33)	47	94.0	50	100			
	High	-	-	-	-			

*Significant using Students-t-test for two independent means at 0.05 levels of significance .

Table 2 Distribution of TSH, TT4 andTT3 in T1DM patients group according to age and sex.

		No.	TSH (mIU/L) (Mean±SD)	TT4 (nmol/L) (Mean±SD)	TT3 (nmol/L)
Age (years)	4	1	3.4±	97.1±	2.2±
	5	5	4.0±2.16	100.2±4.60	2.0±0.09
	6	12	4.6±2.41	100.1±6.37	1.8±0.18
	7	13	3.7±1.90	104.2±16.82	1.8±0.46
	8	7	3.9±1.81	101.7±6.75	1.8±0.15
	9	8	4.4±2.88	100.8±8.17	1.7±0.31
	10	4	5.6±1.72	99.6±6.19	2.0±0.31
	P value		0.800	0.960	0.463
Sex	Male	27	4.0±2.07 (3/50=5.55%)	99.2±5.54	1.9±0.22
	Female	23	4.5±2.26 (6/50=13.04%)	104.0±13.23	1.8±0.38
	P value		0.384	0.089	0.080

***Significant using ANOVA test for difference among three means and more or Students-t-test for difference between two independent means at 0.05 level.**

Discussion

In this study significantly increased serum TSH concentrations ($p< 0.008$) in T1DM patients as compared to non-diabetic controls. Our findings are accordance with Cardoso et al. (1995) [6] who determined thyroid function and the prevalence of thyroid autoimmunity in T1DM in Africans. Thyroid hormone levels were significantly lower in T1DM patients than in the control population and the T2DM population. Subclinical hypothyroidism was present in 21 % of the 28 T1DM patients. A. Ditta et al (2001) [7] which presented significantly elevated serum TSH concentrations ($p< 0.01$) in type 1 diabetics as compared to the normal controls and 30% diabetic patients showed significantly elevated TSH ($P<0.001$). Umpierrez et al. (2003)[8] in cross sectional studies have reported that risk of thyroid dysfunction in patients with T1DM is 2-to-3 folds (10-30%) higher than in general population (5-10%), also found that hypothyroidism was more common in female (41 %) than in male (19%) subjects and Soliman GZA et al. (2012)[9] Study on 500 type I

diabetic children and 500 non diabetic euthyroid egyptian children. He found TSH > 5 μU/ml; (P<0.001) and prevalence of subclinical hypothyroidism was 11.2%. ,similar result found in this study as the Mean concentrations of TSH were 4.05 ± 1.98 mlU/L in the patients with type 1 diabetic and this is significantly higher than the control group 2.29±0.87 mlU/L with Statistically significant difference (p <0.008). The likely explanation for this association with thyroid abnormalities is a common underlying predisposition leading to co existing autoimmune destruction of pancreatic islet cells and autoimmune attack on thyrocytes. But other studies were reported against our study such as Palanisamy et al. (2008)[10] showed that TSH was significantly lower in diabetics than in non-diabetics(1.98±1.01:IU/mL vs 2.44 ± 1.23 :IU/mL, p<0.05), because of the TRH synthesis decreases in diabetes, and this could be responsible for the occurrence of low thyroid hormone levels in diabetics.

In our study, the percentage of l hypothyroidism in diabetic group was higher in females (13.04%) than in males (5.55%); however there was no significant difference, the results were supported by studies of Sacks et al [11] who reported the incidence of hyperthyroidism were lower in females (8%) than males (11%) but the incidence of hypothyroidism were higher in females (16.8%) than males (9.9%) because TSH level were increased and decreased in diabetic females and males respectively .

Conclusion

Thyroid dysfunctions in type 1 diabetic children (high percentage of the estimation of TSH and a lesser degree TT3) and this may be useful in early identification of thyroid dysfunction in T1DM patients without any clinical signs of thyroid disease.

Recommendation

Routine assessment of thyroid hormone levels (especially TSH level) in type I diabetic patients, particularly those with diabetic duration more than 5 year.

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