ORIGINAL ARTICLE

Prevalence of Thyroid Dysfunction in Type1 Diabetic Children in Jordan

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ABSTRACT

Aim: The aim of this study is to determine the prevalence of clinical and biochemical thyroid dysfunction in type1 diabetic children in Jordan in the period between Jan 2009-Jun 2010 at King Hussein Medical Centre. The association of type1 diabetes and thyroid dysfunction has been reported worldwide.

Subject and method: A total number of 116 children with type1 diabetes (62 males and 54 females), age 1-16 years children were examined for signs of thyroid dysfunction and an estimation of thyroid size by using palpation were performed and TSH, T3 and T4 were measured to evaluate the prevalence of thyroid dysfunction.

Result: The prevalence of thyroid dysfunction in diabetics was 12.93%, 6.9% of them were subclinical hypothyroidism, 3.4% of them showed hypothyroidism and 0.86% of them showed hyperthyroidism, 1.7% of them showed hyperthyroidism, sex distribution showed 27% males and 73% females those with thyroid dysfunction, which means higher than normal population of same age group. Goiter prevalence by palpation was presented in 9.5% of diabetic patient which is related to poor iodinated food intake and poor seacoast in Jordan.

Conclusion: We conclude the higher prevalence of thyroid dysfunction in type1 diabetes than normal population, we recommend that the thyroid testing should be done routinely at time of diagnosis of children with type1 diabetes.

Key words: Diabetes, Thyroid dysfunction, Children

INTRODUCTION

The prevalence of thyroid dysfunction in children with type1 diabetes is varies considerably between 3 and 50% in different countries[1.2], in Jordan there is a high consanguinity and a diet is poorly iodinated and absence of seacoast and fresh seafood is available during the time, so the prevalence of thyroid dysfunction is highly reported in general population comparisons with this study in developing countries. Insulin dependent diabetes mellitus (IDOM) is associated with other autoimmune disease, especially thyroid disorders (Riley 1981).

The prevalence of thyroid autoimmunity in children and adolescents with type1 diabetes has been reported between 3.9 and 50% in various studies (Barek 1990, Lorini 1996, Lindberg 1997) and they include hashimoto thyroiditis and graves disease (Lorini 1996, Roldan 1999, Pearce 2003). It is very important to detect thyroid disease or autoimmunity in children because of its progression to subclinical hypothyroidism in 11% and overt hypothyroidism in 3% of them (Pearce 2003). The early detection of thyroid dysfunction in diabetic patient and early treatment improve the insulin effect in those patient and decrease the lipid disorder in future of diabetic patient in controlling the hypothyroidism (Mohn 2002, Taddei 2003,Gonzales 2007) to decrease unfavorable outcomes in children with diabetes, subclinical hypothyroidism should be diagnosed early and treatment started promptly. We decided to investigate the prevalence of thyroid dysfunction especially subclinical hypothyroidism among newly diagnosed children and adolescents with type1 diabetes in Jordan.

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MATERIAL AND METHODS

One hundred-sixteen children (62 males and 54 females) with type1 diabetes attending the outpatient clinics at pediatric endocrinology and diabetes division at King Hussein Medical Centre were matched to 93 healthy children in the study during the period between January 2008 and January 2010, their age range between (1- 16 years) and (3-17 years), median age is (12.43 Yrs) and (10.5 Yrs) respectively. Diagnosis of type1 diabetes was done on base of world health organization criteria. All patients were receiving insulin and were asymptomatic for thyroid dysfunction. None of subjects with diabetes were in ketoacidosis,

immediately after glycemic control after diagnosis all of them, they were screened for thyroid dysfunction.

None of the patients screened was given any medication affecting thyroid dysfunction and children with history of autoimmune thyroid disease in family or history of previous thyroid disorders were excluded from the study. Blood glucose of diabetic patient was controlled at the moment of blood sampling according to the level of HpA1c. All diabetic patients perform clinical examination for manifestation of thyroid dysfunction and thyroid gland size was reported by palpation and classified according to the WHO into grade 0 not palpable ,1 palpable but not visible and 2 visible goiter.

All parents and patients asked about nature of food iodinated in parallel to asses thyroid dysfunction, venus sample was performed to asses levels of thyroid hormones and TSH level. All measurements were done in a single laboratory with the same method. Normal range values were 4-6.5 ng dL for T3, 0.89-1.8µg dL for T4 and 0.3-4.9 iUml for TSH.

Subclinical hypothyroidism was defined as an elevated TSH level more than 4.9 iuml together with normal serum thyroid hormone levels. Hypothyroidism was defined as an elevated TSH with a decrease in serum thyroid hormone level. Subclinical hyperthyroidism was defined as a decrease in TSH below 0.3 iuml together with normal thyroid hormone levels but hyperthyroidism defined as a decrease in TSH level together with elevated in thyroid hormone levels. The results were presented as mean±SD and comparisons of groups were done by Mann-Whitney's unpaired rank sum test. Comparisons of frequencies were performed by chi-sequined [X^2] test $p<0.05$ was considered statistically significant.

RESULTS

The screening of thyroid dysfunction was performed in 116 diagnosed children and adolescents with type1 diabetes (62 males and 54 females) mean age of patients and controls was 12.42 and 11.97 years respectively, which was no different age groups. As shown in table 1 the thyroid biochemical test results between the both cases and control groups was significantly different. Table 2 indicates results of biochemical thyroid dysfunctions in both groups which gives a significant different result

The hypothyroidism in both presentation of subclinical hypothyroidism and frank hypothyroidism are more frequent in diabetic patient rather than control groups.

But the subclinical hyperthyroidism showed no significance in both screened groups, in the other way the frank hyperthyroidism showed significant difference in both groups, when two cases were found in diabetic groups and one single case found in the control groups, Table 3.

The size of goiter estimated by physical examination was present in 9.5% (11 children) with diabetes and in 8.6% (8 children) of control groups, the result was not significant in both groups with was shown in table 4, but no any child having thyroid dysfunction with goiter in control groups. Table 5 shows the sex distribution of thyroid dysfunction which represent more frequent in female than in male and there is no difference in significance in both cases and control groups.

Table 1: Age and sex distribution in the cases and control

Groups	**Sex**		**Age in years**
Cases (n=116)	Male (n=62)	Female (n=54)	12.43 Years
Control (n=93)	Male (n=39)	Female (n=54)	10.5 Years

Table 2: TSH, T3 and T4 value in cases and controls.

Biochemical parameters	**Cases (n=116)**	**Controls (n=95)**	**P value**
TSH (iUml)	6.02	2.75	0.03
T4 (µg/dL)	0.52	1.45	0.02
T3 (ng/mL)	3.9	5.9	0.003

P* < 0.05 significant

Table 3: Distribution of clinical presentation in cases and controls

Clinical presentation	**Cases (n=116)**	**Control (n=93)**	**P-value**
Subclinical hypothyroidism	8(6.9%)	3(3.2%)	0.009
Hypothyroidism	4(3.4%)	1(1%)	0.0002
Subclinical hyperthyroidism	1(0.86%)	1(1%)	Ns
Hyperthyroidism	2(1.7%)	1(1%)	0.02
Total number	15(12.93%)	6(6.45%)	0.01

Table 4: Goiter distribution in cases and controls

Goiter grade	Cases (n=116)	Controls (n=93)	P-Value
1	6(55%)	5(62%)	Ns
2	5(45%)	3(38%)	Ns

Table 5: Sex distribution of thyroid dysfunction

	Cases (n=116)	Controls (n=93)	P-value
Male	4(27%)	2(25%)	Ns
Female	11(73%)	4(75%)	Ns

P-value <0.05 significant

DISCUSSION

Thyroid dysfunction may affect diabetes management. The excess of thyroid hormone led to insulin-assistance state and accelerate the presentation of hyperglycemia, the insulin resistance fell once normal thyroid function was restored to normal and helped to attenuate for the beta-cell destruction when beta-cell mass was relatively well preserved. (Nadeem Abdullah 2007). Thyroid disease usually increases with age and hypothyroidism is the most common thyroid disorder in the normal and diabetic population, the prevalence of thyroid disorders are higher in diabetic patient rather than normal population worldwide because the patients with one autoimmune disease are at risk of developing other autoimmune disorders. (Mckennas 1990, Puna 1994)

In a previous study in Jordan, prevalence of thyroid dysfunction was 8.9% in patients with type1 diabetes, 5.1% of them were subclinical hypothyroidism and 3.8% were hypothyroidism but found in control group 4.7% having subclinical hyperthyroidism with significant difference in thyroid function variable between diabetes and controls. (AR Radiadeh 2003)

In our study the prevalence of thyroid dysfunction in diabetic patient was 12.93%, 6.9% of them were subclinical hypothyroidism, 3.4% hypothyroidism and 0.86% subclinical hyperthyroidism, 1.7% showing hyperthyroidism which indicates that the prevalence is higher than normal control as previous studies. Also the sex distribution is more common in female rather than male in our study, which represent 3 times more frequent in female than male in both groups of controls and cases. The thyroid enlargement in our patient represent 9.5% of patients and 8.6% in control groups which was higher than other population due to several causes like consanguinity, poor iodinated salt and poor seafood available all the time due to poor seacoast in Jordan.

In another study at multi control survey of high number of patients (two times more than our study, By Olga Kordonouril) 21.6% were found having significantly elevated antisodien ,of at least one thyroid antibody and at least one occasion was significantly more frequent in children with diabetes. We did not evaluate thyroid antibodies which is not our purpose of the study.

CONCLUSION

The screening of thyroid function in diabetic patients in children is mandatory, because the prevalence of autoimmune disease together is high, it affects the treatment and control of hyperglycemia and its effect on development and metabolism, early detection of thyroid dysfunction in diabetic patients with early management of asymptomateic of thyroid dysfunction achieve better diabetic control and prevention of thyroid disorder.

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