Editorial

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# Is the Thyroid Gland Another Victim of Diabetes Mellitus?

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## Editorial

Diabetes mellitus (DM) and thyroid diseases are the two common endocriniopathies seen in the adult population. Worldwide prevalence of DM for all age groups is supposed to reach 7-9% in 2030, while, thyroid dysfunctions affect about 5-7% of adults [1]. Both insulin and thyroid hormones are intimately involved in cellular metabolism and thus excess or deficit of either of these hormones could result in the functional derangement of the body systems. Unpredictable thyroid disorders may adversely affect the metabolic control and add more risk to an already predisposing type 2 DM.

Is there a recognized association between DM and thyroid disease? Is it a simple association or more? These are two universal questions which have been subtracted in several endocrinal and metabolic studies.

Early, about 40 years ago, Feely and Isles studied in 1979 the relation between DM and thyroid dysfunction [2], and since then there have been many reports on the state of thyroid dysfunction in diabetics.

In 1982 Schlienger JL et al. reported that, in euthyroid individuals with DM, the serum Triiodothyronine (T3), Tetraiodothyronine (T4), basal Thyroid Stimulating Hormone (TSH) levels and TSH response to Thyrotropin Releasing Hormone (TRH) may all be strongly influenced by the glycemic status [3]. Later on in 1994, a higher prevalence of abnormal TSH concentration in type 2 DM (31%) was reported by Celani et al. [4]. One year after, in 1995, a wide research study was done by Perros et al. [5]. They studied a randomly selected group of 1310 diabetic adults and the overall prevalence of thyroid disease was found to be 13.4%, and was highest (31.4%) in Type 1 diabetic females, and lowest in Type 2 diabetic males (6.9%). New thyroid disease was diagnosed in 6.8%; the commonest diagnosis was subclinical hypothyroidism (4.8%), followed by hypothyroidism (0.9%), hyperthyroidism (0.5%), and subclinical hyperthyroidism (0.5%).

Coiro et al. in 1997 found, TSH responses and “low T3 state” may return to normal with enhancement in glycemic control. However, even with good diabetes manage, the normal nocturnal TSH peak may not be restored in C-peptide negative patients i.e. those with totally absent pancreatic beta cell function [6]. Furthermore, Smithson in 1998 reported a prevalence of undiagnosed thyroid disease in 5.5% of diabetics receiving community diabetes care while the prevalence in the entire population of diabetic patients registered in general practice was 10.8% [7].

Another interesting study was presented by Radaideh et al. in 2004 on a group of 908 type 2 DM [8]. As a direct result of screening, there was a significant difference between diabetics and control subjects. The overall prevalence of thyroid disease was found to be 12.5%. New thyroid disease cases were diagnosed in 6.6% of the patients. The most common was subclinical hypothyroidism (4.1%). In the control group, the prevalence of thyroid disease was 6.6%. The most common was subclinical hypothyroidism (5%). Similar confirming results were observed in type 1 DM by Joseph et al. in 2011 and in type 2 DM by Maskey et al. [9,10].

Although several studies have shown the association between thyroid autoimmunity and type 1 DM, little is known of the risk of thyroid autoimmunity in subjects with type 2 DM. In 2006, Akbar et al. investigated the association between thyroid dysfunction; thyroid autoimmunity and type 2 DM. GAD65ab were found in 26% diabetics and 2% controls. Thyroid autoimmunity was detected in 10% diabetics vs. 5% controls, while thyroid dysfunction was found in 16% and 7% respectively. In GAD65ab-positive diabetics, thyroid autoimmunity was observed in 27% vs. 4% GAD65ab-negative diabetics and thyroid dysfunction was reported in 42% and 7% respectively [11]. These data were discussed later on in different studies with different approaches. In 2012, Wang et al. investigated the prevalence of positive thyroid antibodies in children with type 1 DM. They concluded that, Genetic background and abnormal function of T-lymphocytes may be involved in the elevated prevalence of positive thyroid antibody in type 1DM children [12]. Similarly, in 2016, Orzan et al. reported a frequent presence of thyroid autoimmunity among type 1 DM patients, correlated with female gender, long diabetes duration and aging [13]. In addition, Yousefzadeh et al. documented, latent autoimmune diabetes in adults patients may face with lower serum levels of C-peptide and thyroid-specific antibodies indicating insulin therapy requirement and autoimmune fundaments of the disease [14].

Various studies were done to detect concomitant factors which may affect the association between thyroid dysfunction and diabetes. Moura et al. found that, in DM, differences in thyroid hormones levels compared to non-diabetic individuals were related to increased body mass index and subclinical inflammatory activities [15]. Wang documented that, insulin resistance is another factor contributed with thyroid dysfunction [16]. In elderly and according to Gopinath et al. the incidence of thyroid dysfunction in diabetic and non diabetic was 7.1% and 3.8% respectively [17]. On the other hand, Qorbani et al. results show no association between DM and thyroid dysfunctions with osteoporosis [18].

Recently, in 2017 adding to the previous researches, the objective of Khan et al. study was to find out again the percentage of thyroid dysfunction in patients with type 2 DM and non diabetic subjects. The percentages were 23.5% and 12% respectively [19]. Moreover, Xu and Zhang reported abnormal levels of thyroid hormones and related antibodies in patients with Gestational DM, state which may have affected outcome of pregnancy and the intellectual level of their infants [20].

Finally, depending on the different results of several published studies, the abnormal thyroid hormone levels found in diabetes is a fact and could be attributed to the decrease TRH synthesis and/or impaired TSH response to it. That is in addition to the presence of insulin resistance, an inhibitor of extra thyroidal conversion enzyme of T4 to T3, and dysfunction of the hypothalamus-hypophyseal-thyroid-axis.

In conclusion, abnormal thyroid function is increased in frequency in a diabetic population. TRH synthesis decreases in DM, and this could be responsible for the incidence of abnormal T3 and T4 levels in diabetic patients. Such disorders may adversely affect the metabolic control and add more risk to already liable diabetics. For this reason, thyroid function should be screened annually in diabetic patients to detect asymptomatic thyroid dysfunction early.

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