Section: General Medicine

Original Research Article

A STUDY ON DISORDERS OF THYROID IN PATIENTS WITH TYPE 1 DIABETES MELLITUS

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Received *: 04/03/2024*
Received in revised form *: 04/05/2024*
Accepted *: 20/05/2024*

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DOI: 10.5530/ijmedph.2024.2.72

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2024; 14 (2); 370-373

ABSTRACT

Background: Type 1 Diabetes Mellitus is a chronic endocrinological condition commonly affecting children and young adults. type 1 diabetes mellitus due to its autoimmune pathogenesis is frequently associated with autoimmunity to other hormones such as thyroid. This study aims to assess the prevalence and profile of thyroid disorders in patients with type 1 diabetes mellitus.

Materials and Methods: 150 patients with type 1 diabetes mellitus presenting to the OPD of Department of general medicine, Owaisi Hospital, Deccan Medical College, Hyderabad over 1 year were included in the study. The thyroid hormone profile and presence of thyroid peroxidase antibodies were estimated.

Results: The most common thyroid disorder observed in present study is hypothyroidism. Amongst the ones who were tested positive of thyroid peroxidase antibodies, most of them were hypothyroid. No cases of hyperthyroidism were observed in present study.

Conclusion: patients with T1DM are at increased risk of developing other autoimmune endocrinological conditions such as autoimmune thyroid disorders. Screening for thyroid disorders in T1DM patients and their timely management will prevent complications related to dysregulated thyroid hormone and glucose metabolism.

Keywords: Thyroid, hypothyroid, autoimmunity, type 1 diabetes mellitus.

INTRODUCTION

Type 1 Diabetes mellitus is predominantly seen in the younger age group due to its autoimmune pathogenicity which destroys the pancreatic beta cells, thereby rendering the patients to be insulin deficient.

Patients with T1DM are more prone to develop other autoimmune conditions such as Graves' disease, Hashimoto's thyroiditis, vitiligo, autoimmune hepatitis, and pernicious anemia. However, the most commonly associated autoimmune condition is autoimmune thyroid disorder.[1,2]

Due to autoimmunity mediated mechanisms, antibodies are targeted against specific β-cell autoantigens like glutamic acid decarboxylase (GAD), islet cells (ICA), and insulin (IAA).[3]

It is difficult to diagnose thyroid disorders in patients with T1DM as most of the patients remain asymptomatic and the only complaints, they have are due to diabetes.[4]

Thyroid hormones have a vital role to play in the metabolism of glucose. Patients with hypothyroidism have a tendency to fall into hypoglycemia and are associated with delayed growth and development, increased risk of cardiovascular conditions and hyperlipidemia. While patients with hyperthyroidism can have deranged and elevated glucose levels, making them more prone to develop diabetic ketoacidosis.[5-7]

Given the high frequency, absence ofclinical features, and its significant impact on morbidity, it is advisable to screen for autoimmune thyroid diseases in patients with type 1 diabetes.

MATERIAL AND METHODS

This prospective study was conducted in the Department of General Medicine, Owaisi Hospital,

Deccan Medical College, Hyderabad over a period of 1 year, i.e. from April 2023 to March 2024.

Inclusion Criteria

Patients who have been previously diagnosed with type 1 diabetes mellitus based upon:

- Presence of symptoms of diabetes, OR
- Presence of random glucose levels > 200 mg/dL, OR
- Presence of fasting blood sugar levels > 126 mg/dL, OR
- Presence of 2- hour post prandial plasma sugar levels > 200mg/dL, and
- Patient is on insulin therapy since the diagnosis of diabetes.

Exclusion Criteria

Age below 14 years of age, pregnancy, history of other autoimmune conditions (other than thyroid disorders) and patient is on treatment for the same, presence of multinodular goitre, patients with known thyroid disorders an who are on treatment for the same, presence of history of any thyroid surgery or intake of radioiodine therapy.

After taking a written informed consent, a detailed history of patients was taken. Venous blood sample was collected and the following parameters were tested - T3, T4, TSH; Thyroidperoxidase antibodies.

The tests will be interpreted as follows

- Hyperthyroidism
- T3/T4abovetheupperlimitofnormalalongwithTSH levels below 0.5mIU/ml. Hypothyroidism: T3/T4valuebelowthelowerlimitofnormalalongwithTSHlevels above5mIU/ml.
- Subclinical hypothyroidism: TSH levels>5mIU/ml along with normalT3,T4 levels.
- Subclinical hyperthyroidism: TSHlevels <0.5mIU/mlalongwithnormalT3,T4 levels.
- Thyroidautoimmunity: Thyroid peroxidase antibodies>40IU/ml.

The data was analysed using SPSS software. Chi-square test was used to signify the difference between two variables. Statistical significance was taken for p value < 0.05.

RESULTS

150 patients with T1DM were included in the study. There were a total of 85 males and 65 females. The study subjects aged between 14-33 years with mean age of 22.5 + 6.2 years. The mean duration of diabetes was 10 + 6.5 years. The number of patients with clinical hypothyroidism were 30, out of which 6 were males and the rest 24 were females. There were 20 patients with subclinical hypothyroidism. No cases of hyperthyroidism were found. Thyroid peroxidase antibodies were positive in 25 patients out of which 20 were females and the rest 5 were males. Amongst the 25 patients with TPOA positivity, 21 had hypothyroidism and 4 were euthyroid. The mean age of patients with autoimmune thyroid disorder was 15 + 2.8 years.

Table 1: Thyroid status of diabetic patients

Thyroid status	Males	Females	Total
Hypothyroidism	6	24	30
Subclinical hypothyroidism	3	17	20
Hyperthyroidism	Nil	Nil	Nil

Table 2: Age distribution of patients

Age (in years)	No. of patients
10-15 years	26
16- 20 years	60
ears	40
>30 years	24

Table 3: Age of onset of T1DM

Age of onset (in years)	No. of patients
0 – 5	10
6-10	36
11-15	61
16 – 20	26
21 -25	17

Table 4: Thyroid autoimmune status

Thyroid autoimmunity	females	males	total
TPOA positive	20	5	25
TPOA negative	45	80	125

Table 5: thyroid hormone profile status in autoimmunity

	Hypothyroid	Subclinical hypothyroidism	Euthyroid	total
TPOA positive	21	1	3	25
TPOA negative	9	19	97	125

DISCUSSION

This prospective study included 150 patients with T1DM amongst whom 50 had thyroid disorders (33.3%). Roldan et al,[8] and Mc Canlies et al,[9] had reported a prevalence of 17.6% and 26.6% respectively. AdrianaFranzeseetel10observed a prevalence as high as 50% at initial screening.

Presence of antibodies against thyroid hormones or thyroid peroxidase is the harbinger of the onset of thyroid dysfunction in patients with T1DM. O Kordonouri et al,[11] observed 659 patients with T1DM and found that the cumulative incidence of hypothyroidism at 10 years was 0.69(0.08)inpatients with thyroid peroxidase antibodies positivity.

Similar to present study, 33% of the patients had thyroid dysfunction in a study conducted by Umpierrezetal,[12] but unlike present study where most of them were hypothyroid, subclinical hypothyroidism was more commonly observed in their study.

In present study, out of the 50 patients with both clinical and subclinical hypothyroidism, TPO antibodies were positive in 25 of them, (50%) with majority of them being females. Similar to present study, Umpierrezetal,[12] observed that 83% of females and 51% of males had hypothyroidism on follow-up. Thyroid peroxidase antibodies had 67% positive predictive value and 90% negative predictive value to predict the onset of autoimmune thyroid disorders in their study, i.e. patients with TPO antibodies were17.91timesat more risk to develop hypothyroidism.

Maugendre D et al,[13] had observed that only 24% of T1DM patients with TPO positivity had deranged thyroid function and none of the patients who had negative TPO antibodies had deranged thyroid function.

In present study, no cases of hyperthyroidism were reported, however, Gemma et al,[14] reported a 4% prevalence of hyperthyroidism. The prevalence of thyroid disorders as observed in the study by Roldan et al,[8] were as follows-11% subclinical hypothyroidism, 3% over thypothyroidism, 3% subclinical hyperthyroidism and 6% over thyperthyroidism.

Thyroid autoimmune disorders are most prevalent in females. This holds true to the present study and also to studies done by GemmaC et al,[14] O Kordonouri et al,[11] and Holl RW et al,[15]

However, contrary to this statement, Menon PS et al16, Glastras et al,[17] and FN Bennedbaek et al18showed that gender has no influence on the development of autoimmune thyroid disorders.

Kordonouri et al11observed in their study, later onset of thyroid disorders in patients with T1DM.

CONCLUSION

Hypothyroidism is more common in patients with T1DM than hyperthyroidism. Early screening for thyroid disorders in patients with T1DM will help improve the diabetic control and thus preventing multiple complications.

Acknowledgements: The authors would like to thank the entire staff of Department of general medicine for extending their valuable support in conducting this study.

Conflicts of Interest: NIL.

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