

## Original Research

### To assess the thyroid dysfunction in type 2 Diabetes mellitus patients in a known area

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#### ABSTRACT:

**Background:** The present study had been carried out to evaluate the thyroid dysfunction in type 2 diabetes mellitus subjects in a known area. **Material and methods:** A cross-sectional investigation was carried out on a sample of one hundred people over the age of twenty who had been diagnosed with type 2 diabetes. Those who attended the hospital throughout a four-month period were chosen as participants. Each person had their levels of insulin resistance (IR), free triiodothyronine (fT3), free thyroxine (fT4), and thyroid-stimulating hormone (TSH) measured. The American Diabetes Association's criteria were used to determine a person's status as having diabetes. Based on their thyroid profiles, the participants were then divided into groups that were hypothyroid, hyperthyroid, and euthyroid. **Results:** Out of the total of 200 patients, thyroid dysfunction was seen in 56 patients. Hence; overall prevalence of thyroid dysfunction was 28 percent of the patients. Out of these 56 patients, 30 patients were of subclinical hypothyroidism while 24 patients were of hypothyroidism. Hyperthyroidism was seen in 2 patients. Non-significant results were obtained while assessing the correlation of thyroid dysfunction with age and gender-wise distribution of patients. **Conclusion:** A major contributing factor to inadequate treatment of type 2 diabetes is the failure to detect changes in thyroid hormone levels. Thus, in order to improve medical care and reduce morbidity, thyroid hormone levels in type 2 diabetics must be measured on a regular basis.

**Keywords:** thyroid function, diabetes mellitus

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#### INTRODUCTION

Diabetes mellitus (DM) and thyroid dysfunction (TD) are two of the most common chronic endocrine illnesses, with varying prevalence in various cultures. Approximately 6.6% of adults in Europe and the US have TD.<sup>1-3</sup>; it increases with age and is higher in women than in men. Both hyperthyroidism and hypothyroidism can develop in severe or subclinical forms.<sup>4</sup> T3, the active thyroid hormone (TH), exerts a negative feedback at the level of both thyrotrophs in the pituitary and tanocytes in the hypothalamus; it induces a reduction in TRH, as well as TSH secretion in response to adequate tissue levels of TH. Thus, in subclinical hyperthyroidism (SHyper) and subclinical hypothyroidism (SHypo), respectively, low or elevated blood TSH with TH levels at the upper and lower ranges of their reference range characterize subclinical thyroid disorders (STDs).<sup>5</sup> Hence, this

study had been carried out to evaluate the thyroid function in type 2 Diabetes mellitus patients in a known area.

#### MATERIAL AND METHODS

A cross-sectional investigation was carried out on a sample of one hundred people over the age of twenty who had been diagnosed with type 2 diabetes. Those who attended the hospital throughout a four-month period were chosen as participants. Each person had their levels of insulin resistance (IR), free triiodothyronine (fT3), free thyroxine (fT4), and thyroid-stimulating hormone (TSH) measured. The American Diabetes Association's criteria were used to determine a person's status as having diabetes. Based on their thyroid profiles, the participants were then divided into groups that were hypothyroid, hyperthyroid, and euthyroid.

## RESULTS

Out of the total of 200 patients, thyroid dysfunction was seen in 56 patients. Hence; overall prevalence of thyroid dysfunction was 28 percent of the patients. Out of these 56 patients, 30 patients were of

subclinical hypothyroidism while 24 patients were of hypothyroidism. Hyperthyroidism was seen in 2 patients. Non-significant results were obtained while assessing the correlation of thyroid dysfunction with age and gender-wise distribution of patients.

**Table 1: Prevalence of thyroid dysfunction**

Thyroid dysfunction	Number of subjects	Percentage
Absent	144	72
Present	56	28
Total	200	100

**Table 2: Prevalence rates of thyroid diseases in the study group.**

Thyroid diseases	Number of subjects	Percentage
Subclinical hypothyroidism	30	15
Hypothyroidism	24	12
Hyperthyroidism	2	1

## DISCUSSION

Diabetes mellitus (DM) and thyroid dysfunction (TD) are endocrinopathies that are commonly seen in routine practice, and they frequently coexist. A high prevalence of TD is seen among both type 1 (T1DM) and type 2 (T2DM) diabetes mellitus patients.<sup>6</sup> Autoimmunity can explain the common linkage between T1DM and autoimmune thyroid diseases; however, the linkage between T2DM and TD is more complicated. T2D is due to a progressive loss of  $\beta$  cell insulin secretion commonly on the background of insulin resistance.<sup>7</sup> In 2013 it was estimated that ~382 million people had DM, of whom 90% to 95% had T2D.<sup>7</sup> According to the World Health Organization, the prevalence of DM is expected to increase to 592 million by 2035, developing in ~7.8% to 8.8% of adults with an epidemic risk of T2D in populations such as China, Oceania, South and Central Asia, Latin America, and the Middle East.<sup>8-11</sup> Hence, this study was conducted to assess the thyroid function in type 2 Diabetes mellitus patients in a known area.

Out of the total of 200 patients, thyroid dysfunction was seen in 56 patients. Hence; overall prevalence of thyroid dysfunction was 28 percent of the patients. Out of these 56 patients, 30 patients were of subclinical hypothyroidism while 24 patients were of hypothyroidism. Hyperthyroidism was seen in 2 patients. Non-significant results were obtained while assessing the correlation of thyroid dysfunction with age and gender-wise distribution of patients. The study conducted by Rai S et al (2013)<sup>12</sup> compared the levels of thyroid hormones, serum creatinine, glycated haemoglobin and urine microalbumin between type 2 diabetics without any complications, type 2 diabetics with nephropathy and age and sex matched normal controls. The mean serum T3 level in type 2 diabetics without any complications was  $91.27 \pm 14.56$  ng/dl, in type 2 diabetics with nephropathy was  $88.5320 \pm 30.87$  ng/dl and in controls was  $134.98 \pm 28.55$  ng/dl. The mean serum T4 level in type 2 diabetics without any complications was  $7.73 \pm 1.42$   $\mu$ g/dl, in type 2 diabetics with nephropathy was  $7.25 \pm 2.72$   $\mu$ g/dl and

in controls was  $8.61 \pm 1.73$   $\mu$ g/dl. The mean serum TSH level in type 2 diabetics without any complications was  $3.99 \pm 1.87$   $\mu$ UI/ml, in type 2 diabetics with nephropathy was  $4.27 \pm 1.62$   $\mu$ UI/ml and in controls was  $2.07 \pm 1.09$   $\mu$ UI/ml. Correlations between T3, T4, TSH with serum creatinine, glycated haemoglobin were not statistically significant in type 2 diabetics without any complications and diabetic nephropathy. We found a statistically significant correlation between T3 and urine microalbumin in patients with diabetic nephropathy. Failure to recognize the presence of abnormal thyroid hormone levels may be a primary cause of poor management of diabetes mellitus type 2. Therefore there is a need for the routine assay of thyroid hormones in type 2 diabetics and diabetic nephropathy in order to improve the quality of life and reduce the morbidity.

Palma CC et al (2013)<sup>13</sup> investigated the prevalence of TD in patients with type 1 and type 2 diabetes mellitus (T1DM and T2DM). This is an observational cross-sectional study. Three hundred eighty-six (386) patients with T1DM or T2DM that regularly attended the outpatient clinic of the Diabetes unit, Hospital Universitário Pedro Ernesto, participated in the study. All patients underwent a clinical and laboratory evaluation. Thyroid dysfunction was classified as clinical hypothyroidism (C-Hypo) if TSH > 4.20  $\mu$ UI/mL and FT4 < 0.93 ng/dL; Subclinical hypothyroidism (SC-Hypo) if TSH > 4.20  $\mu$ UI/ml and FT4 ranged from 0.93 to 1.7 ng/dL; Subclinical hyperthyroidism (SC-Hyper) if TSH < 0.27  $\mu$ UI/ml and FT4 in the normal range (0.93 and 1.7 ng/dL) and Clinical hyperthyroidism (C-Hyper) if TSH < 0.27  $\mu$ UI/ml and FT4 > 1.7  $\mu$ UI/mL. Autoimmunity were diagnosed when anti-TPO levels were greater than 34 IU/mL. The positive autoimmunity was not considered as a criterion of thyroid dysfunction. The prevalence of TD in all diabetic patients was 14.7%. In patients who had not or denied prior TD the frequency of TD was 13%. The most frequently TD was subclinical hypothyroidism, in 13% of patients with T1DM and in 12% of patients with T2DM. The

prevalence of anti-TPO antibodies was 10.8%. Forty-four (11.2%) new cases of TD were diagnosed during the clinical evaluation. The forty-nine patients with prior TD, 50% with T1DM and 76% with T2DM were with normal TSH levels. They conclude that screening for thyroid disease among patients with diabetes mellitus should be routinely performed considering the prevalence of new cases diagnosed and the possible aggravation the classical risk factors such as hypertension and dyslipidemia, arising from an undiagnosed thyroid dysfunction. A major contributing factor to inadequate treatment of type 2 diabetes is the failure to detect changes in thyroid hormone levels. Thus, in order to improve medical care and reduce morbidity, thyroid hormone levels in type 2 diabetics must be measured on a regular basis.

### CONCLUSION

A major contributing factor to inadequate treatment of type 2 diabetes is the failure to detect changes in thyroid hormone levels. Thus, in order to improve medical care and reduce morbidity, thyroid hormone levels in type 2 diabetics must be measured on a regular basis.

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