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A Study Of Thyroid Disorders Among The Patients Of Type 2 Diabetes Mellitus

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Abstract*: Diabetes Mellitus and Thyroid disorders are the most common endocrine diseases globally. These have been shown to mutually influence each other. Thyroid disorders, including both hypo- and hyper have been associated with insulin resistance due to various mechanisms. Level of Thyroid Stimulating Hormone (TSH) was measured. The study was carried out in Govt. Medical College and attached group of hospitals, Kota, Rajasthan. The study period was from January 2016 to June 2016 .A total of 124 Diabetic patients (type 2) were included in the study. The estimation of TSH was done in Department of Biochemistry, Govt. Medical College, Kota, Rajasthan , India. Among the 124 cases of type 2 DM, we found 1 overt hyperthyroid (< 0.05mU/L), 7 subclinical hyperthyroid (0.05-0.3mU/L) , 4 overt hypothyroid (>10mU/L) ,10 subclinical hypothyroid (4.5-10mU/L) and 102 euthyroid patients(0.3-4.5mU/L). The results were compared by one - way ANOVA. P value was found to be < 0.05, which is highly significant. In our study we found that 17.74% reported various types of thyroid disorders. Thus, estimation of serum TSH should be included in the routine investigations of diabetes mellitus. This study may be helpful for public health and clinical practice.*

Keywords*: Diabetes Mellitus, Euthyroid, Hyperthyroid, Hypothyroid, Insulin Resistance, Thyroid Stimulating Hormone (TSH),*

I. Introduction

Diabetes mellitus (DM) is one of the most common non-communicable diseases globally [1]. Type 2 diabetes is a heterogeneous disorder. Three basic metabolic defects characterize the disease: insulin resistance, an insulin secretary defect that is not autoimmune-mediated, and an increase in glucose production by the liver [2]. Type 2 diabetes comprises 90% of people with diabetes around the world [3]. Thyroid disorders are widely common with variable prevalence among the different populations [4]. Diabetes and thyroid disorders have been shown to mutually influence each other and associations between both conditions have long been reported [5].

The main patterns of thyroid dysfunctions are hyperthyroidism, subclinical hyperthyroidism, hypothyroidism and subclinical hypothyroidism [6]. Hyperthyroidism is the increased activity of thyroid gland and prevalent in 2 -5% population worldwide [7]. Subclinical hyperthyroidism is the condition in which TSH levels are suppressed whereas FT4 and FT3 are normal [6]. Hypothyroidism is decreased activity of thyroid gland. Subclinical hypothyroidism is defined as elevation of TSH whereas FT4 levels are seen within the normal range [8].

The relationship between thyroid disorders and diabetes mellitus is characterized by a complex interdependent interaction [9]. Thyroid hormones are insulin antagonists, both insulin and thyroid hormones are involved in cellular metabolism and excess and deficit of any can result in functional derangement of the other [10]. Thyroid hormones exert profound effects in the regulation of glucose homeostasis. These effects include modifications of circulating insulin levels and counter-regulatory hormones, intestinal absorption, hepatic production and peripheral tissues (fat and muscle) uptake of glucose. It has long been known that thyroid hormones act differentially in liver, skeletal muscle and adipose tissue – the main targets of insulin action [11]. While thyroid hormones oppose the action of insulin and stimulate hepatic gluconeogenesis and glycogenolysis [12] they up-regulate the expression of genes such as GLUT-4 and phosphoglycerate kinase, involved in glucose transport and glycolysis respectively, thus acting synergistically with insulin in facilitating glucose disposal and utilization in peripheral tissues [13]. Thyroid disorders, including both hypo- and hyper have been associated with insulin resistance due to various mechanisms [14].

Measurement of plasma TSH concentration provides the cornerstone of biochemical evaluation of thyroid status, both in overt and subclinical primary thyroid disorders[6]. A normal TSH effectively excludes primary thyroid dysfunction. Normal level of TSH is 0.3 – 3.5 mU/L, in hyperthyroidism TSH level is <0.1mU/L and in hypothyroidism, level of TSH > 10mU/L [6]..

Aims And Objectives

To estimate the levels of TSH in all the confirmed cases of type 2 DM, so as to establish a relation between thyroid dysfunctions and type 2 DM. This study may be helpful for public health and clinical practice.

II. Material And Methods

The study was carried out in Govt. Medical College and attached group of hospitals, Kota, Rajasthan. The study period was from January 2016 to June 2016 .A total of 124 males and females, with confirm diagnosis of type 2 DM of age groups 45-55 years of age were included in the study.

The patients with DM type 1, chronic renal failure, cardiovascular diseases, liver disorders, previously diagnosed with any thyroid disorders, pregnant females, males and females of age <45 years , > 55 years and patients on treatment for any thyroid dysfunction were excluded from the study.

Sample: The sample of males and females were collected after confirmation of diagnosis of type 2 DM. After obtaining consent of the patient, 5ml of blood was withdrawn. Then centrifugation was done at 3000rpm for 10 minutes and subsequently the serum sample obtained was analysed on Roche Cobas e 411 by chemiluminescence for TSH in Hormonal Assay Lab, Department of Biochemistry, Govt. Medical College, Kota, Rajasthan, India.

Statistical Analysis

The statistical analysis was performed by using Microsoft Excel Program. The results were expressed as Mean ± Standard Deviation. The P value was calculated and found < 0.05, which was considered statistically significant. The results were compared by one - way ANOVA between overt hyperthyroid, subclinical hyperthyroid, overt hypothyroid , subclinical hypothyroid and euthyroid cases.

III. Results

Among the 124 cases of type 2 DM, we found 3 overt hyperthyroid (< 0.05mU/L), 12 subclinical hyperthyroid (0.05-0.3mU/L) , 5 overt hypothyroid(>10mU/L) ,16 subclinical hypothyroid (4.5-10mU/L) and 88 euthyroid patients(0.3-4.5mU/L).

S.NO.	TYPE OF THYROID CATEGORIES	NUMBER OF PATIENTS
1.	Overt Hyperthyroid	1 (0.8%)
2.	Subclinical hyperthyroid	7 (5.6%)
3.	Overt Hypothyroid	4 (3.2%)
4.	Subclinical hypothyroid	10 (8.06%)
5.	Euthyroid	102(82.26%)
Total number of patients		**124**

Table1: Showing number of patients in different thyroid categories.

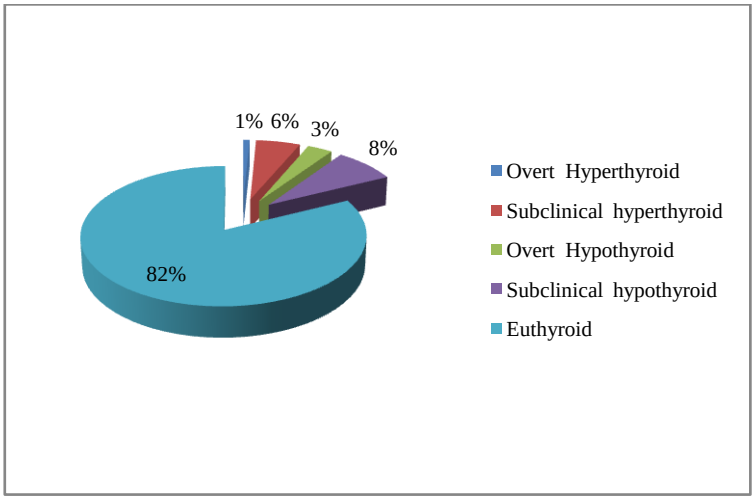

FIGURE 1: Showing Distribution Of Patients Of Type 2 Diabetes Mellitus In Various Thyroid Disorders.

In our study we found that 17.74% reported various types of thyroid disorders among the total type 2 diabetic patients.

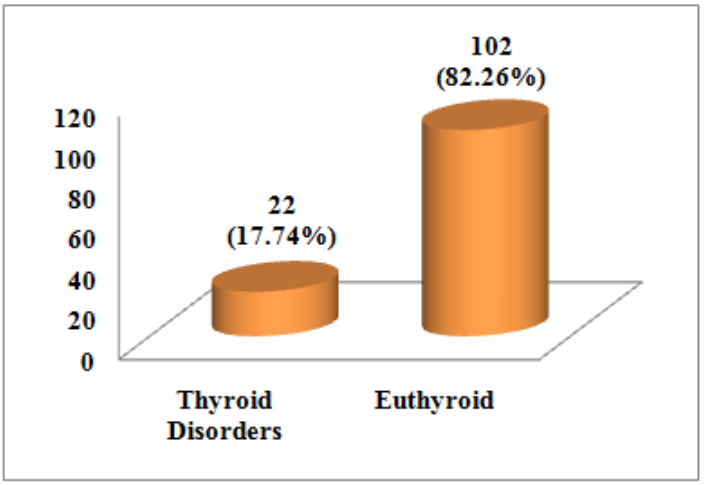

FIGURE 2: Prevalence of Thyroid dysfunction in Type2 Diabetes Mellitus

The Mean ± SD in case of hyperthyroidism is 0.022 ± 0.01. The Mean ± SD in case of subclinical hyperthyroidism is 0.17 ± 0.03. The Mean ± SD in hypothyroidism is 15.1± 2.48. The Mean ± SD in case of subclinical hypothyroidism is 5.90 ± 0.88 and the Mean ± SD in case of euthyroidism is 2.63 ± 0.84. P value is < 0.05, which is significant.

PARAMETER	Overt Hyperthyroid	Subclinical hyperthyroid	Overt Hypothyroid	Subclinical hypothyroid	Euthyroid	P Value
TSH(mU/L) Mean ± SD	0.022± 0.01	0.17 ± 0.03	15.1± 2.48	5.90 ± 0.88	2.63 ± 0.84	<0.05*

Table 2: Showing Mean ± SD in different thyroid categories.* P value is <0.05, which is significant**.**

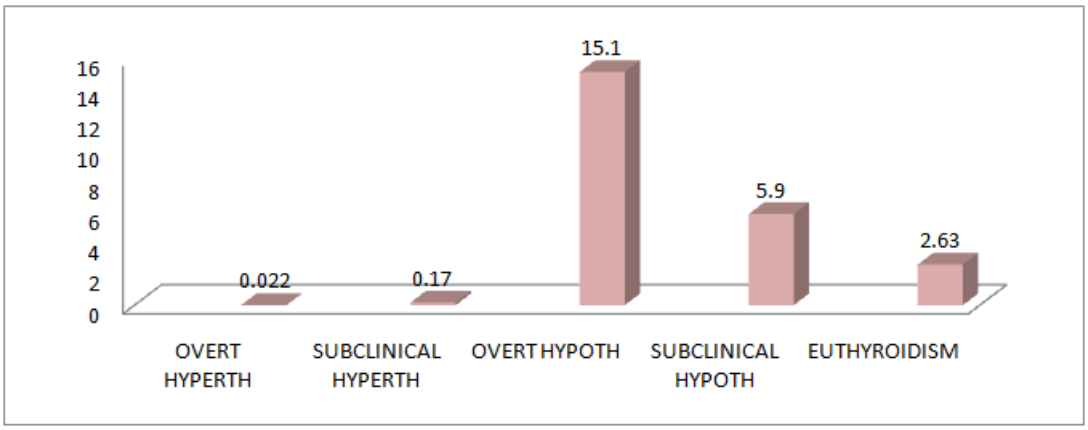

FIGURE 3: Showing the Mean of Serum TSH in various thyroid categories.

IV. Discussion And Conclusion

Diabetes mellitus is characterized by chronic hyperglycaemia, that is, high blood glucose due to derangement in carbohydrate, fat, and protein metabolism. Diabetes mellitus is associated with absolute or relative deficiencies in insulin secretion, insulin action or both [15,16].According to the World Health Organization (WHO), Diabetes mellitus affects more than 170 million people worldwide, and this number will rise to 370 million by 2030 [17,18]. Diabetes mellitus is classified primarily into Type I and Type II. TYPE I Diabetes mellitus is mainly idiopathic or caused by autoimmune disorders. Type II Diabetes mellitus arises from insufficient production of the hormone insulin from beta cells of the pancreas or in conditions where the peripheral receptors; primarily muscles, liver and fat tissue do not respond adequately to normal insulin levels known as insulin resistance [19].

A prevalence of 12.3% was reported among Greek diabetic type 2 patients [20] and 16% of Saudi patients with type 2 diabetes were found to have thyroid dysfunction [21]. In Jordan, a study reported that thyroid dysfunction was present in 12.5% of type 2 diabetic patients [22], and an Indian study showed 28.75% of abnormal thyroid function tests among type 2 diabetic patients [23]. The prevalence was 12.9% in a Kuwaiti study [24].

In our study we found that 17.74% (approx. 18%) reported various types of thyroid disorders among the total type 2 diabetic patients.

By this study we conclude that subclinical hyperthyroidism and hypothyroidism is more prevalent than overt hyperthyroidism and hypothyroidism among the diabetic patients. Thus, estimation of TSH can be included in routine investigations in the diabetic panel so that it can decrease the pathologies associated with thyroid dysfunction to a great extent, thus it will be helpful by decreasing the morbidity & reduce the DALY(Disability Adjusted Life Years).

Limitation

- Further studies are needed to explore, whether Diabetes Mellitus is a causative factor in pathogenesis of thyroid dysfunctions.

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