

Prevalence of thyroid disorders in patients with diabetes mellitus in South Indian Population.

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Abstract:

Introduction: Diabetes is a common problem seen in one third of the population. Prior studies reveal that many patients also have associated thyroid dysfunction. However there are not many published studies on these in India. The prevalence of thyroid dysfunction in diabetics is 2-3 times more than non diabetic patients. Blood glucose is affected by high thyroid levels or low thyroid levels. When thyroid levels are high, there is elevation of blood glucose. This is because the body uses up insulin faster due to acceleration of general metabolism by thyroid. When there is hypothyroidism, the insulin is used up slower, so blood glucose can get reduced. Thyroid hence, play an important role in maintaining regular blood glucose and insulin levels. Anytime it is out of control, it could cause abnormal glucose levels. Uncontrolled Hypothyroidism causes weight gain while uncontrolled hyperthyroidism causes weight loss. These weight changes can also alter the glycemic control in diabetics. Overall diabetes and thyroid dysfunction causes unpredictable changes in glucose levels. So, thyroid abnormality the easily correctable disease between these two - thyroid and diabetes should be screened for and corrected in every diabetic. Before we start screening for thyroid dysfunction in diabetics, we should know the prevalence of the disease in our settings. **Aim:** This study aims to uncover the prevalence of thyroid dysfunction among diabetics in an urban diabetic clinic in south India. **Methodology:** In this retrospective study, data of 724 patients with diabetes who attended an diabetic clinic in saveetha Medical College and Hospital from September 2018 to May 2019, and whose thyroid stimulating hormone were tested for were included. The inclusion criteria are: Diabetes - both known and newly diagnosed in whom TSH has been done within the last one year. The exclusion criteria are: Age less than 20 years, patients on drugs that can affect thyroid function tests and are pregnant. **Results:** Thyroid disorders were found in 136 out of the 724 diabetic patients. Most common thyroid abnormality

among diabetics was hypothyroidism 123 (16.9%) followed by hyperthyroidism 10 (1.4%) and sub clinical hypothyroidism 3(0.4%). Prevalence of thyroid disorders was found to be more in females. Conclusion: To conclude, every fifth patient with type 2 diabetes will have a thyroid disorder. 9 out of 10 patients with thyroid disorder in diabetes mellitus will suffer from hypothyroidism. Though subclinical hypothyroidism and hypothyroidism are seen in diabetics, it is relatively uncommon. A clinical protocol of screening all diabetics for thyroid function at initial evaluation will help in diagnosing and treating the disease earlier.

Key words: *Diabetes mellitus, Hypothyroidism, Hyperthyroidism and Thyroid*

1. INTRODUCTION:

Diabetes mellitus is one of the modern pandemics and an important health problem worldwide. Type 2 diabetes mellitus affects both the old and young people and is highly associated with morbidity, mortality. It was found to affect 382 million (7.7%) in 2013 and was estimated to 483 million (8.3%) by the year 2030. In developed countries, more than half of the people with type 2 diabetes mellitus are 65 years and only 8% are less than 44 years of age. In developing countries, 75% of diabetic patients are 45 years old and above and 25% of adults with diabetes mellitus are under 44 years [1]. The recent studies shows, low-income countries of have the fastest growing rates of diabetes mellitus whereby the diabetes population has drastically increased from an estimated 98,000 patients in 2000 to about 1.5 million in 2010 from a population of 30 million people [2]. Globally, according to the International Diabetes Federation (IDF), there are 352 million adults with impaired glucose tolerance which is a high risk of developing diabetes by 2045 [3]. Thyroid disease and diabetes mellitus are the two most common endocrine disorders encountered in clinical practice which have been shown to mutually influence each other, and association between these conditions has long been reported. An unrecognised thyroid disorder may adversely affect the metabolic control and add more risk to an already predisposing scenario of cardio vascular diseases [4, 5]. There is great variability in the prevalence of thyroid disorder in general population, ranging from 6.6% to 13.4%. The assessment of thyroid function by modern assays is both reliable and relatively inexpensive. Diabetics have a higher prevalence of thyroid dysfunction compared with normal population. This is mainly because patients with one organ-specific autoimmune disease are at the risk of developing other autoimmune disorders. It is not surprising that up to 30% of Type 1 diabetic patients have thyroid disease. The diagnosis of thyroid dysfunction in diabetic patients solely on clinical manifestations can be very difficult as they are very deceptive. For example, poor glycemic control can produce features similar to hyperthyroidism, such as weight loss despite increased food intake and fatigue. On the other hand, a bad case of diabetic nephropathy can be mistaken for hypothyroidism which causes symptoms like oedema, fatigue, pallor and weight gain. It's also highly important to take a note on the subclinical features. For example, subclinical hypothyroidism can elevate serum LDL cholesterol and worsen preexisting dyslipidemia. A study on 7,097 T1DM patients reported a prevalence of 9.5% of thyroid dysfunction. A clinic based study comprising of both T1DM and T2DM patients (1310 patients) reported a higher prevalence of (13.4%) of thyroid dysfunction [6]. Hypothyroidism is the most common type

of thyroid dysfunction and is more common in women. Hyperthyroidism is less common. Hypothyroidism usually is autoimmune in origin, presenting either in atrophic hypothyroidism or Hashimoto's thyroiditis. Hence, the aim of this study is to investigate the prevalence of thyroid disorder in type 2 diabetes mellitus in a clinical practice.

2. MATERIAL AND METHODS:

The study was conducted on 724 patients of diabetes mellitus aged above 20 years. Patients with diabetes mellitus along with thyroid dysfunction were taken for the study and patients on drugs affecting thyroid function and acutely ill critical patients were excluded from the study. A thorough clinical history regarding diabetes mellitus (onset, duration), any history of long-term illness, any previous thyroid dysfunction, previous history of any kind of drug therapy, whether the patient was on insulin or oral hypoglycaemic drugs was sought. A thorough clinical examination including vitals, general physical examination, systemic examination and investigations was carried out. Biochemical investigations were carried out using proper aseptic precautions for collecting blood. Patients were examined for presence of diabetes mellitus according to ADA criteria for diagnosis of diabetes mellitus. All diabetic patients were then subjected to estimation of BMI, HbA1C, serum cholesterol, serum triglyceride, HDL, VLDL, and LDL levels. All evaluations were done in NABL accreditation lab. FBS and RBS estimation was done by GOD - POD method. HbA1C levels were estimated by using Finecare HbA1c Rapid Quantitative Fluorescence immunoassay. BMI was calculated using Quetlet's Index:- $BMI = \text{weight}/(\text{height in metres})^2$. Serum cholesterol estimation was done by CHOD - PAP method. Serum triglyceride estimation was done by GPO PAP method. HDL estimation was done by PEG method. LDL levels were calculated as following:- $VLDL = TG/5$ $LDL = \text{Total cholesterol}-HDL-VLDL$ Then all the patients were evaluated for thyroid dysfunction by testing thyroid profile(Free T4 and TSH). Thyroid hormone levels were measured by Mindray Third generation Chemiluminescence Immunoassay. Normal values: Free T4 = 0.60 – 1.81 ng/ml TSH = 0.35 – 5.1 $\mu\text{IU/L}$ Subclinical hypothyroidism was defined as an elevated TSH level with normal serum Free T4 levels. Hypothyroidism was defined as an elevated TSH together with a decreased serum Free T4 levels. Subclinical hyperthyroidism was defined as a low TSH with normal Free T4 levels. Hyperthyroidism was defined as low TSH with Free T4 levels. The observations and interpretations were recorded and results obtained were statistically analyzed. The study was conducted in saveetha Medical College and Hospital after obtaining institutional ethical clearance (SMC/IEC/2018/11/42).

3. RESULTS:

Thyroid disorders were found in 136 out of the 724 diabetic patients. Most common thyroid abnormality among diabetics was hypothyroidism 123 (16.9%) followed by hyperthyroidism 10 (1.4%) and sub clinical hypothyroidism 3(0.4%). There was one patient with post radioiodine therapy induced hypothyroidism but this patient was excluded from the study. Prevalence of thyroid disorders was found to be more in females. The values are expressed in table 1 and figure: 1.

Table I: Correlation of thyroid disorders with gender in diabetic patients.

S.no	Variables	Male	Female
1	Number of diabetic patients	309(22.8%)	415(77.2%)
2	Number of patients with thyroid dysfunction	136(18.8%)	
3	Number of patients with euthyroid	588(81.2%)	
4	Number of patients with hypothyroidism	26(21.1%)	97(78.9%)
5	Number of patients with subclinical hypothyroidism	00(0.00%)	03(0.4%)
6	Number of patients with hypothyroidism	02(20%)	08(80%)

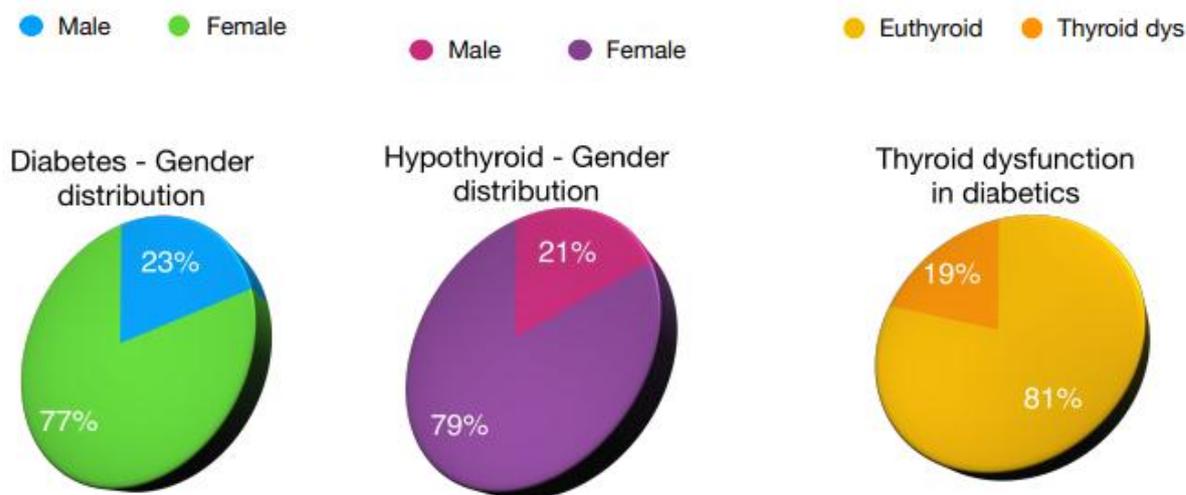


Figure: 1 shows the various percentage distribution of Diabetes and Thyroid dysfunction in male and females.

4. DISCUSSION:

In the present study, out of the 724 diabetic patients, 136 (18.8%) patients had thyroid dysfunction and 588 (81.2%) patients were found to be euthyroid. The findings of our study are not consistent with studies of Papazafiropoulou et al [7] (overall prevalence of thyroid disorders was 12.3%), Nobre et al [8] (overall prevalence of thyroid disorders was 12.7%) and Radaiedeh et al [9]. Hypothyroidism was the most prevalent disorder in diabetic patients in our study, occurring in 16.9%, followed by hyperthyroidism in 1.4% and subclinical hypothyroidism in 0.4% of the total 724 diabetic patients. Our results are not in concordance

with the results of Perros et al [10], Celani et al [11], Nobre et al [8], Chubb et al [12], Babu et al [13], and Radaiedeh et al [9]. In the present study, the prevalence of thyroid disorders was more in females as compared to males (77.2% vs 22.8%). Our results are consistent with studies of Papazafiropoulou et al [7], Celani et al [11], Vondra et al [14], Pimenta et al [15], Babu et al [13] and Michalek et al [16] in which they also reported prevalence of higher thyroid disorders in diabetic women as compared to diabetic men. Thus, prevalence of thyroid disorders in diabetic patients is strongly influenced by female gender [17].

5. CONCLUSION:

To conclude, every fifth patient with type 2 diabetes will have a thyroid disorder. 9 out of 10 patients with thyroid disorder in diabetes mellitus will suffer from hypothyroidism. Though subclinical hypothyroidism and hypothyroidism are seen in diabetics, it is relatively uncommon. A clinical protocol of screening all diabetics for thyroid function at initial evaluation will help in diagnosing and treating the disease earlier.

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