



**CLINICAL STUDY ON PREVALENCE OF THYROID DYSFUNCTION IN NEWLY DIAGNOSED TYPE II DM, WITH SPECIAL REFERENCE TO OBESITY**

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**Key words:**

DM - Diabetes Mellitus, CVD - Cardiovascular Disease, HbA1c - glycosylated hemoglobin, TFT - Thyroid Function test, TD - Thyroid Dysfunction

**ABSTRACT**

**Introduction:-** Diabetes Mellitus(DM) is one of the major public health issues facing the world in 21<sup>st</sup> century.425 million people have DM in the world out of which 72 million are in India, and by 2045 this will rise to 123.5million by 2040.DM is an endocrine disorder so it is prone to affect other endocrine functions, one of which is thyroid function.DM influences thyroid dysfunction in two sites, first at level of hypothalamus by controlling TSH release and second at peripheral tissues by converting T4 to T3.Diagnosis of thyroid dysfunction in DM patients based solely on clinical manifestations can be difficult. The present study was therefore undertaken to study prevalence of thyroid dysfunction in Newly Detected Type II DM patients & to study correlation between thyroid profile, HbA1c and BMI.

**Materials & Methods:-**This is prospective descriptive study in which 70 patients with Newly Detected Type II DM in Rajarajeswari Medical College & Hospital underwent thorough history and clinical examination and also investigations like FBS, PPBS, HbA1C, TFT was carried out. Prevalence rate of thyroid dysfunction was studied and their statistical significance with various parameters was obtained using chi square tests.

**Results:-**Out of the 70 Newly Detected Type 2 DM patients in the study, 18 (25.7%) of them had thyroid dysfunction, out of which 10 (14.2%) have subclinical hypothyroidism, 5 (7.14%) had overt hypothyroidism, 2(2.85%) have subclinical hyperthyroidism &1(1.42%) overt hyperthyroidism case, 7 (10%) of them had BMI >23.

**Conclusion:** This study shows prevalence of abnormal thyroid hormone level (25.7%) among Newly Detected DM subjects. Failure to recognize the presence of abnormal thyroid hormone level at an early stage in Diabetes Mellitus may be a primary cause of poor management often encountered in some treated diabetics. Therefore screening for thyroid disease among patients with Diabetes Mellitus should be routinely performed to rule out possible aggravation of risk factors such as Hypertension and dyslipidemia, which can lead to Cardiovascular Disease risk in such patients.

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**INTRODUCTION**

Diabetes mellitus is one of the major public health issues facing the world in 21<sup>st</sup> century. Globally, an estimated 425 million people have diabetes in the world compared to 108 million in 1980. Out of which 82 million people are in the South- East Asia Region; and by 2045 this will rise to further 151 million more, and also there were over 72.9 million cases of diabetes in India by 2017 according to International Diabetes Federation statistics. [1] The global prevalence of diabetes has nearly doubled since 1980's, rising from 4.75% to 8.55% in the adult population which reflected an increase in associated risk factors such as being obese or overweight. [2] DM is an endocrine disorder so it is prone to affect other endocrine functions, one of which is thyroid function.

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DM appears to influence thyroid function at two sites; first at the level of hypothalamic control of TSH release and second at peripheral tissue by converting T4 to T3. Abnormal thyroid hormone levels are commonly found in diabetic patients, the reason for this is thyroid hormones are insulin antagonists, both insulin and thyroid hormones are involved in cellular metabolism and excess or deficit of either one can result in functional derangement of the other. Reduced glucose absorption from gastrointestinal tract accompanied by prolonged peripheral glucose accumulation; gluconeogenesis, diminished hepatic glucose output and reduced disposal of glucose are hallmarks of hypothyroidism.[3]

The physiological and biochemical inter-relationship between insulin and the influence of both insulin and iodothyronines on the metabolism of carbohydrates, proteins and lipids are recorded and such records indicate that iodothyronines are insulin antagonist with high levels being diabetogenic while absence of the hormone inhibits the development of diabetes

[4]. The thyroid hormone replacement is associated with a decrease in glycosylated haemoglobin (HbA1c) level, which is influenced by increased erythropoiesis rather than by changes in glucose level [5]. Also both Diabetes and thyroid dysfunction are independently associated with risk factors such as obesity, hypertension and Cardiovascular diseases. Hence this present study was therefore undertaken to study the prevalence of thyroid dysfunction in Newly Detected Type II DM patients & to study correlation between thyroid profile, HbA1c and BMI.

**MATERIAL AND METHODS**

**Study place:** Rajarajeswari Medical College & Hospital, Bengaluru.

**Duration of study:** 10 months (Jan 2018 to Oct 2018)

**Study design:** A prospective descriptive study

**Data collection**

Written informed consent for the study was obtained from all of the patients included in this study.

Detailed clinical history regarding diabetes mellitus (onset, duration), any history of long term illness, any previous history of thyroid dysfunction, previous history of any kind of drug therapy, whether the patient was on insulin or oral hypoglycemic drugs was sought and also history of any comorbidities such as hypertension, dyslipidemia were also taken.

A thorough clinical examination including vitals, general physical examination, BMI, systemic examination and investigations like FBS, RBS, PPBS, HbA1C, T3, T4, and TSH 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. Patients were also grouped according Asia-pacific BMI guidelines, i.e.<18.5 - underweight, 18.5-22.9 being normal, 23-24.9 being overweight and >25 being obese.

Prevalence rate of thyroid dysfunction was studied and their statistical significance with various parameters was obtained using chi-square tests.

**Inclusion criteria**

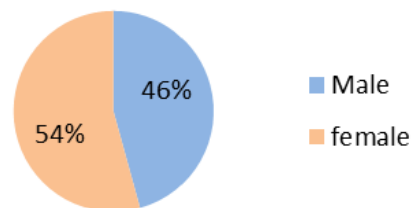
- All patients with Newly detected Type 2 Diabetes mellitus (with FBS > 126mg/dl, HbA1c >6.5% or RBS > 200mg/dl with symptoms suggestive of Diabetes Mellitus polyuria, polydipsia, fatigue, weight loss), Both genders >30years of age who were attending medicine OPD & admitted in all Medicine wards of Rajarajeswari Medical college & hospital.
- Patients taken for this study, had Duration of Diabetes from date of detection not more than 3months.
- Known cases of Hypothyroidism and hyperthyroidism, who are on medications.

**Exclusion criteria**

- Patients with Type I Diabetes Mellitus, Gestational Diabetes mellitus

- Known case of Type 2 Diabetes Mellitus patients who are already on treatment as well as complicated Diabetes Mellitus patients
- Any chronic illness with general debility such as malignancy, Infection

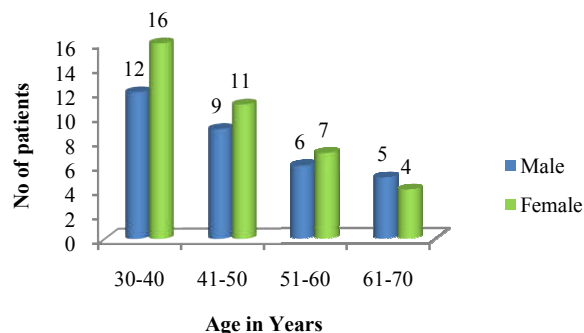
**RESULTS**



**Table 1** Gender Distribution of patients

Gender	No. of patients	%
Male	32	46
Female	38	54
Total	70	100

**Inference:** In this study, out of 70 patients there were 32 (46%) male patients and 38(54%) female patients.



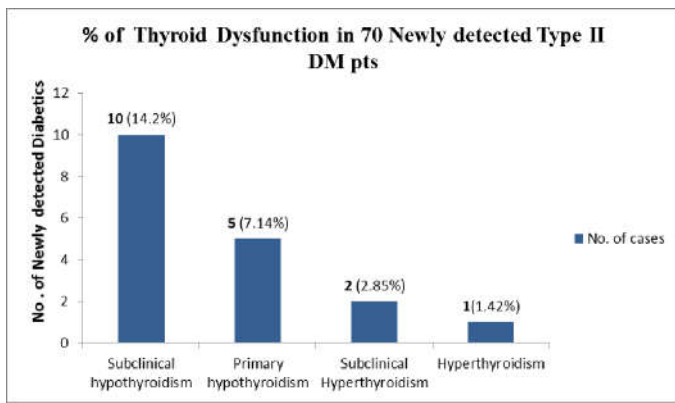
**Table 2** Age Distribution of patients

Age in years	Gender		Total
	Male	Female	
30-40	12	16	28
41-50	9	11	20
51-60	6	7	13
61-70	5	4	9
Total	32(46%)	38(54%)	70(100%)
Mean SD	49.24±11.86	48.42±13.58	49.76±12.24

**Inference:** In this study, out of 70 patients 48 belonged to age group between 30-50years of age, and 21 belonged to age group between 51-70years.

**Table 3**

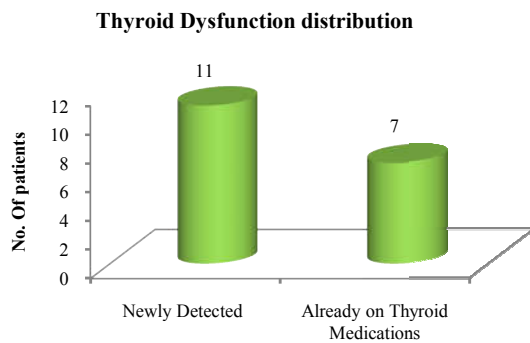
Thyroid Dysfunction	No. of cases (Out of 70 Newly Detected Type II DM pts)	%	BMI > 23
Subclinical Hypothyroidism	10	14.2	3
Primary hypothyroidism	5	7.14	4
Subclinical Hyperthyroidism	2	2.85	0
Overt Hyperthyroidism	1	1.42	0
Total	18	25.7	7



**Inference:** Out of 70 newly detected Type II Diabetes Mellitus patients, 10 (14.2%) of them had subclinical hypothyroidism, 5 (7.14%) had primary hypothyroidism, 2 (2.85%) had subclinical hyperthyroidism and 1 (1.42%) had overt hyperthyroidism.

**Table 4** Thyroid Dysfunction Distribution

Thyroid Dysfunction among 70 newly detected DM patients	No. of patients	%
Newly Detected	11	61
Already on Thyroid Medications	7	39
Total	18	100



**Inference:** Out of 18 patients who had thyroid dysfunction in this study, 11 of them were newly diagnosed with thyroid dysfunction, however remaining 7 of them were already on thyroid medications.

**DISCUSSION**

Diabetes and thyroid disorders have been shown to mutually influence each other and an association between both conditions has been reported in literature [6].

Thyroid disease is a pathological state that can adversely affect glycemic control in diabetics and has the potential to affect the health. Thyroid disease is found commonly in diabetes and is associated with advanced age, particularly in type 2 diabetes and underlying autoimmune disease in type 1 diabetes.

Excessive thyroid hormones increase the rate of digestive tract absorption and increase insulin resistance and insulin degradation. In hypothyroidism, liver secretion of glycogen decreases, so does degradation, leading to increased levels of glycogen. Absorption of glucose from the gastrointestinal tract is slowed, and glucose utilization is slowed in the peripheral tissues. The

availability of gluconeogenic substrate is decreased [7]. Hyperthyroidism impairs glycemic control in diabetic subjects, while hypothyroidism increases susceptibility to hypoglycemia thus complicating diabetes management [6].

Presence of thyroid dysfunction may affect diabetes control. Hyperthyroidism is typically associated with worsening glycemic control and increased insulin requirements. There is underlying increased insulin resistance. Indeed, thyrotoxicosis may unmask latent diabetes.

Although wide-range of changes in carbohydrate metabolism are seen in hypothyroidism, clinical manifestation of these abnormalities is often prominent. However, the reduced rate of insulin degradation may lower the exogenous insulin requirement. The presence of hypoglycemia is uncommon in isolated thyroid hormone deficiency and should raise the possibility of hypopituitarism in a hypothyroid patient. More importantly, hypothyroidism is accompanied by a variety of abnormalities in plasma lipid metabolism, including elevated triglyceride and low-density lipoprotein (LDL) cholesterol concentrations. Even subclinical hypothyroidism can exacerbate the coexisting dyslipidemia commonly found in type 2 diabetes and further increase the risk of cardiovascular diseases. Adequate thyroxin replacement will reverse the lipid abnormalities.

The diagnosis of thyroid dysfunction in diabetic patients based solely on clinical manifestations can be difficult. Poor glycemic control can produce features similar to hyperthyroidism, such as weight loss despite increased appetite and fatigue. On the other hand, severe diabetic nephropathy can be mistaken for hypothyroidism because patients with this condition may have edema, fatigue, pallor, and weight gain.

However, the underlying thyroid dysfunction can produce clinically important physiological effects.

Subclinical hypothyroidism can elevate serum LDL cholesterol and worsen pre-existing dyslipidemia, further increasing the risk of atherosclerosis. Subclinical hyperthyroidism may increase the risk of cardiac arrhythmias and exacerbate angina. Since diabetic patients are at high risk for cardiovascular diseases, the diagnosis and treatment of subclinical thyroid diseases is important.

The presence of anti-thyroid peroxidase (TPO) antibodies is helpful in predicting the development of autoimmune thyroid disorders, especially hypothyroidism. Patients who have anti-TPO antibodies should be screened for thyroid dysfunction on a regular basis, so early detection and treatment is possible. [8] The prevalence of diabetes and thyroid diseases appears to be very high in India. Also there appears to be an increased co-existence of both the diseases suggesting screening of diabetes patients for thyroid diseases which could help improving the disease outcome. A few similar studies have been done in the past, below are listed few of them.

Table 5

Studies previously done on similar topics	Results
1. Thyroid dysfunction in type 2 diabetes mellitus: A retrospective study in 2013 Salaam ranabir, <i>et al</i> Department of Medicine, Regional Institute of Medical Sciences, Imphal, Manipur, India	Out of the 202 Type 2DM pts for the study of which, 63(31.2%) had thyroid dysfunction, predominantly 33(16.3%) had subclinical hypothyroidism
2. A prospective study of thyroid - dysfunction in patients with Type 2 diabetes in general population Dr. Ravishankar, S.N1, <i>et al</i> , MVJ Medical college & Research Hospital, Hosakote, Bangalore, in 2013	A total of 100 Type 2 DM patients, Thyroid disorders were present in 29%. Hypothyroidism in 1, hyperthyroid in 13 and subclinical hypothyroidism in 15(31.25%) cases
3. Prevalence of thyroid dysfunction in patients with diabetes mellitus <i>Diabetology &amp; Metabolic Syndrome</i> 2013;58 Palma <i>et al</i>	The prevalence of TD in 386 diabetic patients who were screened in this study was 14.7%
4. Our Study at RRMCH in 2018	Showed Prevalence of thyroid Dysfunction in 18 (25.7%) subjects among 70 Newly Detected Type II Diabetic pts

## CONCLUSION

Thyroid dysfunction and diabetes are closely associated with each other, through multi-directional pathways. The co-occurrence of these common endocrine conditions impacts clinical presentation and laboratory results, while influencing screening, diagnostic and therapeutic strategies. A high index of suspicion should be kept for thyroid dysfunction in diabetes, especially difficult to maintain effective diabetes management. Therefore, regular screening for thyroid abnormalities in all diabetic patients will allow early treatment of subclinical thyroid dysfunction, in turn to prevent cardio vascular mortality and morbidities.

### Limitations of the study

- Study population was small.
- Associated thyroid autoimmunity was not evaluated due to constraints. Hence, it was not able to define the spectrum of thyroid dysfunction in Type 2 diabetics.
- Follow-up study was not done. Hence, the natural history of subclinical thyroid dysfunction and its effect on various parameters could not be assessed.

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