



## THYROID DYSFUNCTION IN TYPE 2 DIABETESMELLITUS: A STUDY FROM TERTIARY CARE CENTRE.ANDRHA PRADESH

### Medicine

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### ABSTRACT

**Background:** Diabetes mellitus and thyroid diseases are the two common endocrinopathies seen in the adult population. Insulin and thyroid hormones are intimately involved in cellular metabolism. Excess or deficit of either of these hormones could result in the functional derangement of the other. **AIMS & OBJECTIVES OF THE STUDY:** To study the prevalence and spectrum of thyroid dysfunction in patients with type 2 diabetes mellitus. To evaluate the relationship between glycemic control and occurrence of altered thyroid function in type 2 diabetes mellitus.

**MATERIAL AND METHODS:** This is a Cross sectional study done on 100 persons with known type 2 diabetes mellitus or newly detected Type 2 diabetes mellitus without known thyroid disorders either admitted in wards or attending the outpatient in Department of General Medicine, DR.PINNAMANENI SIDDHARTHA INSTITUTE OF MEDICAL SCIENCES & RESEARCH FOUNDATION, chinavutapally, gannavaram. Questionnaire, BMI(Body Mass Index) calculation, Blood pressure, FBS(Fasting Blood Sugars), PPBS(Post Prondial Blood Sugars),Blood Urea, Serum creatinine, Urine analysis,ECG(Electrocardiogram), Chest Xray, Fasting lipid profile,Thyroid profile(T3, T4 and TSH), HbA1C, Fundus examination were done in all patients who were included in the study.

**Results:** In present study 64%(64) of patients were between 41-60 years. 63%(63) of patients were females; 37%(37) of patients were males. 18% (18) of patients had abnormal TSH level. the 18 patients with abnormal thyroid profile, 22.2% (4) of patients had Diabetes more than 10 years, 33.3% (6) had duration between 6-10 years and 44.4% (8) had Diabetes 5 years or less. Conclusion: The present study identified the patients at risk with subclinical hypothyroidism in type 2 diabetes. Therefore, the screening of thyroid dysfunction in type 2 DM patients is essential to reduce the severity of disease and endocrinal abnormalities in diabetic patients.

### KEYWORDS

Type 2 diabetes mellitus, Glycosylated haemoglobin, Thyroid hormone

### INTRODUCTION:

Diabetes mellitus and thyroid diseases are the two common endocrinopathies seen in the adult population. Insulin and thyroid hormones are intimately involved in cellular metabolism. Excess or deficit of either of these hormones could result in the functional derangement of the other. In euthyroid individuals with diabetes mellitus, the serum T3 levels, basal TSH levels and TSH response to thyrotropin releasing hormone (TRH) may all be strongly influenced by the glycemic status. 2 Poorly controlled diabetes, both Type 1 and Type 2, may induce a "Low T3 state" characterized by low serum total and free T3 levels, increase in reverse T3(r T3) but near normal serum T4 and TSH concentrations. 3 Low serum T3 is due to reduced peripheral conversion of thyroxine (T4) to tri-iodothyronine (T3) via 5' monodeiodination reaction and may normalize with improvement in glycemic status but even with good diabetes control, the normal nocturnal TSH peak may not be restored in C-peptide negative patients. 4 Frank diabetes occurs in 2-3%, when hyperthyroidism develops in normal individuals. In known diabetic patients hyperthyroidism causes deterioration of glycemic control status. 3

### EFFECT OF HYPOTHYROIDISM ON GLYCEMIC STATUS

In hypothyroidism, the synthesis and release of insulin is decreased. 5 The rate of hepatic glucose output is decreased probably due to reduced gluconeogenesis. A post receptor defect has been proposed to explain the decrease in insulin stimulated glucose utilization in peripheral tissues. 6 The net effect is an increased risk of recurrent hypoglycemia in a diabetic individual. 7

### MATERIALS AND METHODS:

The present study is a Cross sectional Study was carried out in the Department of General Medicine, DR.PINNAMANENI SIDDHARTHA INSTITUTE OF MEDICAL SCIENCES & RESEARCH FOUNDATION, chinavutapally, gannavaram, during the period January 2014 to October 2015. The study group included 100 persons with known type 2 diabetes mellitus or newly detected Type 2 diabetes mellitus without known thyroid disorders either admitted in wards or attending the outpatient departments who met the inclusion criteria.

**INCLUSION CRITERIA:** Known type 2 diabetes mellitus and

Newly detected type 2 diabetes mellitus subjects who gave informed consent to participate in the study.

**EXCLUSION CRITERIA :** Patients not willing for study, Patients with known thyroid disease, Patients with duration of diabetes more than 15 years, Patients with chronic renal failure and Diabetic nephropathy, Patients with acute illness (sepsis, acute MI, severe heart failure, recent admission in intensive care unit), Patients with hepatic dysfunction, Patients with psychiatric illness, Pregnancy, Patients on treatment with drugs interfering with thyroid function, (Amiodarone, Propranolol, Corticosteroids and Oral Contraceptives) were excluded from the study.

Questionnaire, BMI calculation, Blood pressure, FBS, PPBS, Blood Urea, Serum creatinine, Urine analysis, ECG, Chest Xray, Fasting lipid profile, Thyroid profile (T3, T4 and TSH), HbA1C, Fundus examination were done in all patients. A thorough history was recorded with particular emphasis on symptoms of hypothyroidism and hyperthyroidism. The presence of associated illness like coronary artery disease, hypertension and cerebrovascular accident were noted. Family history regarding diabetes mellitus and treatment history of oral hypoglycaemics or insulin along with duration was also included. A thorough general and systemic examination was carried. The fundus examination for diagnosis of diabetic retinopathy and neurological examination for diabetic neuropathy were also done.

### RESULTS:

Among the study population, 11% (11) of patients were age upto 40 years; 64% (64) of patients were between 41-60 years; above 61 years were 25% (25) of patients as shown in table 1.

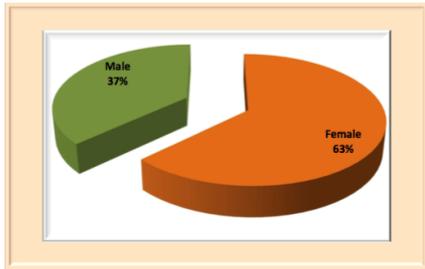
Table-1

#### AGE DISTRIBUTION OF CASES

Age(yrs)	Frequency	Percent
Upto 40	11	11
41 to 60	64	64
Above 60	25	25
Total	100	100

Among the study population, 63% (63) of patients were females; 37%(37) of patients were males as shown in figure 1.

**FIGURE :1**  
**DISTRIBUTION OF CASES ACCORDING TO SEX**



Among the study group, 18% (18) of patients had abnormal TSH level as shown in table 2.

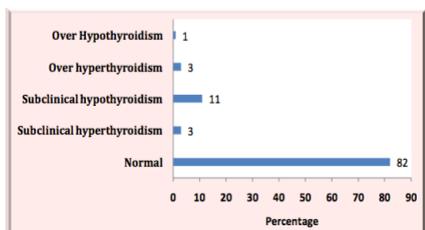
**TABLE:2**  
**DISTRIBUTION OF CASES ACCORDING TO TSH LEVEL**

TSH	Frequency	Percent
Normal	82	82
Abnormal	18	18
Total	100	100

**DISTRIBUTION OF CASES ACCORDING TO ABNORMAL THYROID PROFILE**

TSH	Frequency	Percent
Normal	82	82
Subclinical hyperthyroidism	3	3
Subclinical hypothyroidism	11	11
Over hyperthyroidism	3	3
Over Hypothyroidism	1	1
Total	100	100

**FIGURE:2**

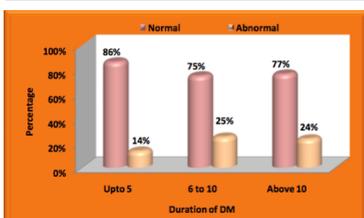


Among the 18 patients with abnormal thyroid profile, 22.2% (4) of patients had Diabetes more than 10 years, 33.3% (6) had duration between 6-10 years and 44.4% (8) had Diabetes 5 years or less. Compared with normal thyroid group it is statistically insignificant.

**ABNORMAL THYROID PROFILE Vs DURATION OF DIABETES**

Duration of DM(yrs)	TSH		Total
	Normal	Abnormal	
Upto 5	51	8	59
	86.40%	13.60%	100.00%
6 to 10	18	6	24
	75.00%	25.00%	100.00%
Above 10	13	4	17
	76.50%	23.50%	100.00%
Total	82	18	100
	82.00%	18.00%	100.00%

Chi-square value = 1.94; P=0.38 NS



**DISCUSSION**  
**AGE DISTRIBUTION**

In the present study of 100 type 2 diabetic patients, 11 patients (11%) were up to 40 years, 64 patients (64%) were between 41-60 years and 25 patients (25%) were 61 years or more. This shows that the disease was more prevalent between 41-60 years of age.

This observation was similar to WHO report which predicts that while the main increase in diabetes would be in the >65 year age group in the developed countries, in India and developing countries the highest increase would occur in the age group of 45-65 year of age group. This observation is also similar to Kapur et al, who reported that maximum number of cases were diagnosed between 40 and 59 year of age with no significant difference between the genders.<sup>9</sup>

In the present study 37% (37 patients) of the studied population were males and 63% (63 patients) were females. Female to male ratio was 1.70:1.

This observation was similar to Arthur M. Michalek et al who reported that prevalence of diabetes among women was higher than in men.<sup>10</sup> This is in contrast to Jali et al<sup>11</sup> and Flatau E et al<sup>12</sup> who reported that diabetes was more prevalent in men than in women. Sample size in our study is too small. This might have affected the results.

In the present study, 18% (18 patients) of the total 100 patients with diabetes mellitus had abnormal thyroid profile. In this study sub-clinical hypothyroidism was more among females 10(55%) compared to males 1 (5.5%). Sub-clinical hypothyroidism was more common among elderly females. Hyperthyroidism was more common in males (11%) than in females (5%). Overt hypothyroidism was present in one male patient in present study.

Many studies have shown increased incidence of sub-clinical hypothyroidism in elderly females compared to males. Hyperthyroidism was more common in males than in females.

The present study is similar to Abdel-Rahman et al who in his study of 908 type 2 diabetic patients found that the prevalence of thyroid disease was 12.5%, 6.6% of whom were newly diagnosed and 5.9% had known thyroid dysfunction. The prevalence of thyroid disease in the non diabetic control group was 6.6%.<sup>13</sup>

Chubb et al in a cross-sectional study of 420 patients with type 2 diabetes mellitus found that 8.6% of patients had sub clinical hypothyroidism.<sup>14</sup>

Pasupathi et al in their study found the prevalence of thyroid disease in type 2 diabetes mellitus was 45%. C.E.J. Udiong found the prevalence of thyroid disease in type 2 diabetes mellitus was 46.50%. Perros et al found the prevalence of thyroid disease in type 2 diabetes mellitus was 6.90%. A.R.M. Radaideh (Jordan study) found the prevalence of thyroid disease in type 2 diabetes mellitus was 12.50%. A. Papazafropoulou (Greek study) found the prevalence of thyroid disease in type 2 diabetes mellitus was 12.30%. Smithson MJ in his study found that the prevalence of thyroid disease in the entire population of diabetic patients registered in the general practice was 10.8%. In the control group of non diabetics, the prevalence was 6.6%.<sup>15</sup>

D.H. Akbar et al in their study of 100 type 2 diabetics found that the prevalence of thyroid dysfunction was 16% and in control group of non diabetics, it was 7%.<sup>16</sup>

Zdrojewicz et al in their study of 75 diabetic patients found that there was no differences in thyroid gland function between patients with type 2 diabetes mellitus and non diabetics. This study contradicts our findings.<sup>17</sup>

In the present study, 11% (11) of the patients had report suggestive of subclinical hypothyroidism and 3% (3) of the patients had report suggestive of subclinical hyperthyroidism 1% of patients had report suggestive of overt hypothyroidism and 3% of patients had overt hyperthyroidism.

This study was similar to Abdel-Rahman et al who in their study of 908 type 2 diabetic patients found that 10.3% of patients had hypothyroidism (overt and sub clinical) and 1.7% of patients had

hyperthyroidism (overt and sub clinical).<sup>13</sup>Smithson et al in their study of 233 diabetes mellitus patients found that 11 patients were found to have undiagnosed thyroid disease, out of which 9 were having hypothyroidism (overt and sub clinical) and 2 were having hyperthyroidism (overt and subclinical).<sup>15</sup>

Celani MF et al in their study of 290 type 2 diabetes mellitus patients found that 91 patients (31.4%) had abnormal TSH concentrations out of which 48.3% had subclinical hypothyroidism, 24.2% had subclinical hyperthyroidism, 23.1% had overt hypothyroidism and 4.4% had overt hyperthyroidism.<sup>7</sup>

MOGETTI et al in their study found 89% had hypothyroidism 11% had hyperthyroidism In one study done in Spain by Diez et al<sup>18</sup> who found an overall prevalence of thyroid dysfunction in 32.4% of type 2 diabetics patients. A study by Perroset al<sup>19</sup> showed a prevalence of 13.4% in diabetics, though the prevalence was more in female type 1 diabetics. A study in Jordan by Radaidehet al<sup>20</sup> found the overall prevalence of thyroid disease in type 2 DM to be 12.5% and 6.6% in the control group and the most common is subclinical Hypothyroidism.

The presence of altered thyroid profile in diabetic patients may be due to the fact that: In euthyroid individuals with diabetes mellitus, the serum T3 levels, basal TSH levels and TSH response to thyrotropin releasing hormone (TRH) may all be strongly influenced by the glycemic status.<sup>2</sup> Poorly controlled diabetes may also result in impaired TSH response to TRH or loss of normal nocturnal TSH peak.<sup>4</sup>

It may be related to older age of the type2 DM patients.<sup>8</sup>Co-existent diabetes may affect the efficacy of thyroid hormone treatment in patients with hypothyroidism. A recent study in elderly patients on L-thyroxine treatment showed that the presence of diabetes was independently associated with inadequate thyroid hormone replacement, an association which was not seen with other chronic disorders. A further interaction may result from the use of the antidiabetic agent, metformin, which has been shown to suppress TSH concentrations in diabetic patients on thyroxine treatment.

**CONCLUSION:** Compared to general population, Prevalence of thyroid dysfunction is more common among type 2 diabetes mellitus patients. A serum TSH within euthyroid range almost always eliminates the diagnosis of hypo or hyperthyroidism. This shows that TSH is preferred screening test for thyroid dysfunction in diabetics. Thyroid disorders are more in females (22.20%) than males (10.8%). Sub-clinical hypothyroidism was more common than other conditions which constituted 11 of 18 (61%) patients of the thyroid dysfunction in the Diabetics. Routine screening for thyroid dysfunction in type 2 diabetes mellitus Patients may be justified in females, because the progression to overt thyroid dysfunction is associated with significant morbidity including the adverse effects on glycemic control, lipid profile, bone mineral density and cardio vascular events.

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