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STUDY OF THYROID DYSFUNCTION IN TYPE II DIABETES MELLITUS

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ABSTRACT: Diabetes Mellitus (DM) has emerged as a common endocrine disorder in the world and the prevalence of thyroid dysfunction is increasing at the same time. The thyroid hormones control insulin secretion. In hypothyroidism there is a reduction in glucose-induced insulin secretion by beta cells, and during thyrotoxicosis the insulin resistance will be increased. Type 2 diabetes mellitus patients with subclinical hypothyroidism are at risk of complications like neuropathy and cardiovascular events. Hence, there is a need to detect subclinical hypothyroidism in diabetic patients. 50 type II DM patients were screened for thyroid function studies viz T3, T4 & TSH. 50 age and sex matched healthy volunteers were treated as controls and the results were correlated with fasting blood glucose levels and lipid parameters. The results showed a significant difference among the controls and the patients. It may be concluded from this study that there is hypothyroidism in DM patients.

INTRODUCTION: Diabetes Mellitus (DM) has emerged as pandemic health problem in the world and it is a common endocrine disorder, which has reached 20% in urban population and 10% in rural population in India. The prevalence of thyroid dysfunction in DM is increasing alarmingly. The World Health Organization (WHO) has projected that the global prevalence of diabetes will increase to 300 million (7.8%) by 2030¹. Some of the factors like sedentary lifestyle, hypertension, dietary indiscretions, ethnicity and obesity are thought to be major contributions². The association of thyroid dysfunction with type II DM is widely known and this study was first published in 1979^{3,4}.

The thyroid hormones directly controls insulin secretion. In hypothyroidism there is a reduction in glucose-induced insulin secretion by beta cells and catecholamines are increased in hyperthyroidism, and insulin resistance will be increased⁵⁻⁷. The DM influences the thyroid dysfunction in two sites, first at the level of hypothalamus by controlling TSH release and second at the peripheral tissues by converting T4 to T3^{8,9}.

It was reported that type 2 DM patients with subclinical hypothyroidism are at risk of complications like neuropathy and cardiovascular events¹⁰. Studies suggested that detection of subclinical hypothyroidism especially in type II DM is required to avoid further complications.

There are contradictory reports regarding the prevalence of thyroid dysfunction among normal and patients with type II DM¹¹. Hence the study was designed to assess the status of thyroid function in type II DM.

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Aims:

1. To estimate the thyroid hormones such as T3, T4 & TSH in type II diabetes mellitus patients.
2. To assess the diabetic status, Fasting Blood Glucose (FBS) will be measured.

MATERIALS AND METHODS:

This is a prospective study which was carried out in the research unit in Shri Sathya Sai Medical College and Research Institute. The study included 50- type II DM patients of age group (35-60 years), and 50- age matched healthy controls. The questionnaires were used to the record the findings on general physical examination.

Inclusion Criteria:

- Sample size – 100 (50- Type II diabetes mellitus patients & 50- age matched healthy controls).
- Age group (35-60 Years) were included.

Exclusion Criteria:

- Post partum women
- Patients having acute illness which affect thyroid gland activity
- The patients having drugs which influence the thyroid hormone status
- The patients who had fever

Instruments used for Analysing the Samples

Fasting blood samples was used to estimate the parameters such as:

- T3, T4 and TSH-estimated by using (CLIA -method) chemi luminescence immune assay method¹²
- Fasting plasma glucose – estimated by using (GOD-POD method) semi auto analyser – COBAS MIRA¹³

- Lipid profile – estimated by using (FLEA-Method) semi auto analyser

Statistical Analysis:

- Statistical analysis was performed by using SPSS software, Student 't' test and Pearson's correlation was used and if the P* value is < 0.005 then it is considered to be statistically significant .

RESULTS:**TABLE 1: ANTHROPOMETRIC AND BIOCHEMICAL MEASUREMENTS**

Parameters	Type II DM Patients	Normal Controls	P* (value)
AGE	43.2±11	44.1±11.6	<0.005
T3	1.27±0.62 nmol/L	1.62±0.54 nmol/L	<0.005
T4	82.14±16.29 nmol/L	85.9±14.09 nmol/L	>0.005
TSH	4.10±3.27 nmol/L	2.48± 1.66 nmol/L	<0.005
Plasma Glucose (FPG)	170 ± 10 mg/dl	93 ±13 mg/dl	<0.005
TGL	190 ± 6 mg/dl	180 ± 10 mg/dl	>0.005

P* (value) <0.005 is considered to be statistically significant

Table 1 shows the anthropometric and clinical measurements of diabetic and non-diabetic subjects which includes (mean age 43.2 ± 11)years and FPG level in type II DM patients was found to be (170±10)mg/dl which is significantly higher than the control subjects (93±13)mg/dl. TGL level was found to be (190±6mg/dl) in type II diabetic patients and (180±10 mg/dl) in age matched healthy controls.

The T3 and T4 levels (1.27±0.62 nmol/L) and (82.14±16.29 nmol/L) were significantly lower in type II DM patients when compared to the non diabetic healthy age matched controls (1.62±0.54 nmol/L) and (85.9±14.09 nmol/L)

Likewise, the serum TSH was significantly increased in type II DM subjects (4.10±3.27 nmol/L) as compared to the non diabetic healthy age matched controls (2.48 ±1.66 nmol/L)

Table 2 shows the correlation of thyroid hormones with the fasting blood glucose level in which The

FPG in Type II diabetes mellitus patients was correlated positively with the T3 and the P* value (<0.005) and r* value (0.48) and it is significant.

TABLE 2: CORRELATION OF THYROID HORMONES WITH THE FPG IN TYPE II DM PATIENTS

Relationship between thyroid hormones and FPG	P* value	r*- values	Significance
FPG vs T3	<0.005	0.48	Significant
FPG vs T4	>0.005	-0.142	In significant
FPG vs TSH	<0.005	0.516	Significant

p* (value) < 0.005 is considered to be statistically significant

The FPG in type II DM patients were correlated negatively with T4 and the P* value was found to be (>0.005) and r*value (-0.142) and it shows negative correlation, which is insignificant

The FPG in type II DM patients were correlated positively with TSH levels the p* value was found to be P*(<0.005) and r*value was found to be (0.516) and is significant.

DISCUSSION: The present study includes 50 type II DM patients and 50 non diabetic age matched healthy controls. It was found that there is a significant reduction in the plasma T3 levels and significant increase in TSH levels in DM patients. The thyroid hormones act as an insulin antagonist which potentiates the insulin action indirectly. In DM, the TRH synthesis decreases and this is responsible for the occurrence of low thyroid hormone levels in diabetes. According to the results obtained in this study, type II DM patients were more prone to hypothyroidism frequently. The results of the present study was corroborated with the report of Gujarat singh et al¹⁴, Demitrost et al¹⁵ Valeri Witting et al¹⁶. This study shows a significant correlation between the thyroid hormones and the blood glucose levels in type II diabetes mellitus patients.

Further research is required to determine the mechanism underlying in this aspect.

SUMMARY AND CONCLUSION: To sum up, 50 patients with type II DM and 50 healthy controls were screened for thyroid function studies. From the above studies it was observed that thyroid

function levels were altered in DM patients, in particular with T3 and TSH levels and it may be concluded that a regular screening of diabetes mellitus patients for thyroid function studies is recommended to avoid further complications of thyroid dysfunctions.

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