

Study of Thyroid Function in Type 2 Diabetes Mellitus Patients

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Abstract:

Background: Thyroid disorders and diabetes mellitus are two common endocrine disorders that are commonly encountered in clinical practice. The relationship between thyroid disease and diabetes is important for physicians to understand in order to provide the best treatment for both conditions. The aim of this study was to assess thyroid function in Type2 Diabetes Mellitus patients of malwa region and raise awareness about thyroid dysfunction in newly diagnosed T2DM patients.

Methods: In this case control study, a total of 200 subjects were chosen. Group I consisted of 100 diagnosed type 2 diabetes cases and Group II 100 sex matched stable controls. After receiving informed consent, patients were enrolled. Thyroid dysfunction in Type2 diabetes mellitus was assessed using biochemical parameters such as fasting plasma glucose, total triiodothyronine T3, total thyroxine T4, and thyroid stimulating hormone (TSH).

Results: When diabetic patients were compared to healthy controls, their fasting blood glucose and serum TSH levels were substantially higher. In these two classes, however, there was no substantial difference in serum T3 and T4 levels. The findings suggest that diabetic patients have subclinical hypothyroidism as opposed to the control group in the study population

Conclusion: From this current study it has been observed that thyroid function levels were altered in Diabetes mellitus patients, especially TSH levels. so it is suggested that diabetes mellitus patients should be screened for thyroid function studies on a regular basis to prevent further complications of thyroid dysfunction.

Keywords: Type 2 diabetes mellitus, Thyroid dysfunction.

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Introduction

Thyroid disorders and diabetes mellitus are two common endocrine disorders that are commonly encountered in clinical practice. Since 1979, medical literature has described a correlation between type 2 diabetes mellitus (T2DM) and thyroid dysfunction [1]. According to International Diabetes Federation 463 million people have diabetes in the world and 88 million people in the South East Asia Region. Of this 88 million people, 77 million belong to India, by 2045 this will rise to 134 million [2]. Diabetes Mellitus and thyroid disorders are endocrine disorders that are interrelated to each other [3]. Normal level of thyroid hormones is required for normal glucose metabolism. Hyper or hypo secretion of thyroid hormones can alter glucose homeostasis [4]. Thyroid disorders not only worsen the metabolic control but also affect the management of diabetes [5]. So, patients with diabetes should have their thyroid function tested. American diabetic Association (ADA) has proposed the people with diabetes to be checked for thyroid disorders [6]. India is emerging as a global leader in diabetes mellitus, with the second-highest number of diabetic subjects, second only to China [7,8]. Thyroid hormones play an important

role in key metabolic pathways because they regulate energy expenditure and storage, maintaining the balance [9]. The connection between Type 2 Diabetes and Thyroid Dysfunction is still a mystery. Thyroid impairment in type 2 diabetes mellitus can exacerbate macro and microvascular complications, as well as morbidity, mortality, and quality of life [10]. The relationship between thyroid disease and diabetes is important for physicians to understand in order to provide the best treatment for both conditions. The aim of this study was to assess thyroid function in Type2 Diabetes Mellitus patients of malwa region and raise awareness about thyroid dysfunction in newly diagnosed T2DM patients.

Material and Method

Study type: case control study, This study was carried out at Government Medical college and Hospital Purnea, Bihar. in collaboration with the Department of Medicine. Study duration is One year. A total of 200 individuals were enlisted. Group I consisted of diagnosed type 2 diabetes cases (n = 100) and Group II consisted of sex-matched stable controls (n = 100). The participants were both male and

female and ranged in age from 30 to 65 years old.

Inclusion Criteria

All the known Type 2 diabetes patients attending OPD for more than 5 years duration.

Exclusion Criteria

- Type I DM
- Known thyroid function disorder
- DM with complication like retinopathy nephropathy and neuropathy
- Alcoholic, smokers, hypertension

Both groups clinical evaluations and personal records were recorded. After receiving informed consent, patients were enrolled in the study. For laboratory analysis blood was drawn from medial cubital vein using sterile disposable syringe after overnight fasting in a grey top sodium fluoride (NaF) vacutainer, and plain tubes for thyroid function. Glucose oxidase-peroxidase (GOD POD) enzymatic method was used to measure fasting blood glucose using the

VITROS5.1 FS machine [11]. Total T3 (serum triiodothyronine), total T4 (serum thyroid hormone), and total TSH (serum thyroid stimulating hormone) were measured using cobas e 411 analyzer [12]. The SPSS 16.0 software was used to conduct the statistical analysis. All of the data was provided as Mean \pm SD. The student t-test was used to determine the statistical significance of the results. The p value of ≤ 0.05 was taken as level of significance

Results

In this study, a total of 200 subjects (n = 200) were chosen. Group I consisted of (n = 100) diagnosed type 2 diabetes cases and Group II (n = 100) sex matched stable controls. There were similar proportions of male and female cases in both group of the study population. the average age of control subjects was 46 ± 6.8 years, while diabetic patients average age was 58 ± 5.4 years. The mean BMI of diabetic patients was 26 ± 2.4 kg/m², which was not significantly higher than the control subjects 24 ± 1.6 kg/m². In this analysis, the average period of diabetes was 6.2 ± 2.4 years.

Table 1: Demographic profile of study subjects

	Cases (n = 100)	Controls (n = 100)
Male	n = 58	n = 58
Female	n = 42	n = 42
Age (30 - 65 years)	58 ± 5.4	46 ± 6.8
Weight (kg)	60 ± 8.6	58 ± 7.4
Height (cm)	158.8 ± 6.8	156.4 ± 7.2
BMI (kg/m ²)	26 ± 2.4	24 ± 1.6
Duration of diabetes (years)	6.2 ± 2.4	

Data are presented as mean \pm SD

Table 2: shows the levels of fasting blood glucose, serum T3, serum T4, and serum TSH in study subjects.

Parameters	Case group	Control group	P value
FBG (mg/dl)	158 ± 26.40	84 ± 10.16	$p < 0.001$
T3 (ng/dl)	138 ± 4.18	132 ± 5.60	$p > 0.05$
T4 (ng/dl)	8.42 ± 2.10	7.68 ± 1.76	$p > 0.05$
TSH (μ IU/ml)	5.42 ± 4.32	1.62 ± 1.40	$p < 0.001$

When diabetic patients were compared to healthy controls, their fasting blood glucose and serum TSH levels were substantially higher. In these two classes, however, there was no substantial difference in serum T3 and T4 levels

Discussion

In this study, diabetic subjects' fasting blood glucose levels were significantly higher ($p < 0.001$) than healthy controls. Similar findings were identified in a number of studies that backed up our findings. When diabetic patients were compared to control subjects, serum T4 levels did not change significantly. Similar results were observed by Gurjeet Singh et al [13] T3 levels in diabetic subjects did not vary significantly from those in control subjects, according to our findings. Our results were consistent

with those of Alok Mawar et al [14] and Swamy et al [5].

When diabetic subjects were compared to healthy control subjects, the serum TSH level was significantly higher. ($p < 0.001$) Earlier studies have documented similar findings

[14]. The findings suggest that diabetic patients have subclinical hypothyroidism as opposed to the control group in the study population. Similar results were reported in the study of Demitrost et al [15] and Valeri Witting et al [16]. In T2DM, altered thyroid status is related to hypothalamic-pituitary-thyroid axis tolerance. T2DM also results in less activation of AMPK (5'-Adenosine Mono Phosphate activated Protein Kinase), which results in decreased thyroid hormone

production. Thyroid hormone deficiency results in increased TSH release from the anterior pituitary gland as a result of feedback [17,18]. Subclinical hypothyroidism will increase the risk of atherosclerosis by affecting serum LDL cholesterol levels. Since diabetic patients were at high risk for cardiovascular disease, the diagnosis and treatment of subclinical thyroid diseases is important [19].

Concomitant subclinical hypothyroidism raises the risk of nephropathy and retinopathy in type 2 diabetes.

Conclusion

From this current study it has been observed that diabetic patients of Bihar region are at risk of developing subclinical hypothyroidism. Thyroid function levels were altered in Diabetes mellitus patients, especially TSH levels, as shown in the above studies, and so it is suggested that diabetes mellitus patients should be screened for thyroid function studies on a regular basis to prevent further complications of thyroid dysfunction.

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