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Evaluation of hypothyroidism as a complication in Type II Diabetes Mellitus

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Abstract

Diabetes mellitus (DM) and Thyroid dysfunction, the two endocrine disorders have found to influence each other. The effects of which are poorly understood. Therefore, the present study was undertaken to understand the association trend of thyroid dysfunction with diabetic process and to assess the hyperglycemic effect by correlating fasting serum glucose (FSG) and thyroid profile parameters. 58 type 2 DM patients were studied for their thyroid profile along with their fasting glucose levels. Analysis was performed by comparing the values with age and gender matched controls using student 't' test. Analysis showed that in type 2 diabetes mellitus patients, 7 (12.06%) patients had hypothyroidism and 18 (31.03%) subjects had subclinical hypothyroidism out of 58 subjects. Serum T3 and T4 hormone concentrations were low and Thyroid Stimulating Hormone (TSH) concentrations were high in Type 2 DM when compared to controls. But significant difference was found with T4 and TSH only (p value : <0.001). FSG did not show significant correlations with thyroid profile parameters. Type 2 Diabetes Mellitus patients are at risk for hypothyroidism and hence have to be followed up with serum TSH levels.

Key words: Diabetes mellitus, Hypothyroidism, Thyroid Stimulating Hormone (TSH)

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Introduction

Diabetes mellitus the common heterogeneous endocrine disorder is rising in India and has reached approximately 20% in urban populations and approximately 10% in rural populations. [1] Diabetes mellitus on long term is associated with vascular complications that are responsible for increased morbidity and mortality among diabetic subjects [2]. New addition to these complications is the thyroid dysfunction which is indicated by the recent studies. [3] Thyroid dysfunction is increasingly found in the diabetes mellitus patients, the prevalence of which is around 13.4%. [4] Diabetes may affect the thyroid function to variable extent and unrecognized thyroid dysfunction not only worsens the metabolic control but also impede the management of diabetes. [5] Also, studies have suggested that type 2 diabetic patients with subclinical hypothyroidism are at risk of complications like nephropathy and cardiovascular events. [6] Therefore, diabetes patients need to be screened for thyroid dysfunction. Therefore, the present study was intended to evaluate the association trend of thyroid hormone dysfunction with diabetic process and to assess the hyperglycemic effect by correlating fasting serum glucose and thyroid profile parameters.

Materials and Methods:

This study was under taken by the Department of Pharmacology, Sri Siddhartha Medical College, Tumkur after the approval of the research and ethical committee. NIDDM patients attending the OPD of the hospital were tested for their fasting blood glucose (FSG), T3, T4 & Thyroid Stimulating Hormone (TSH). Diagnosed NIDDM patients constituting 58 in number with more than 5 years of duration and without the complications like retinopathy, neuropathy and nephropathy were selected. Similar numbers of age matched healthy volunteers were chosen as controls. Both cases and controls were non alcoholic, non smokers and non hypertensives. Diabetics were not associated with other endocrinal or non-endocrinal disorders and were on oral hypoglycemic agents. A total of 116 subjects were studied. Fasting se-

rum samples were collected from all the study subjects. Fasting serum glucose was estimated in an autoanalyser by glucose oxidase method [7] and thyroid profile by CLIA (ChemiluminescenceImmunoAssay) system. Quantitative data summarized to test the difference in mean values obtained for NIDDM patients and controls using student't' test, p value < 0.05 is taken as the level of significance. Further, Pearson's correlation was used to correlate between the FSG and thyroid profile.

Results

Mean age of the subjects were 54.81± 8.29 and 56.76 ± 9.94 in controls and diabetics respectively. The prevalence of hypothyroidism in diabetic patients was found to be 7(12.06 %) and subclinical hypothyroidism (Normal T3, T4 levels associated with raised TSH levels) was found in 18 (31.03%) out of 58 subjects. Results are shown in the tables 1 and 2. Table 1 shows the Mean ± SD of the parameters in controls and diabetics with their comparison. Serum T3 (1.91 ± 0.73 nmol/L) and T4 (78.69 ± 20.69 nmol/L) hormone concentrations were low and TSH (20.26 ± 22.60 µIU/ml) concentrations were high in Type 2 DM when compared to controls (T3, T4 & TSH were 2.09 ± 0.68 nmol/L, 109.50 ± 31.3 nmol/L, 72.64 ± 1.19 µIU/ml respectively). But significant difference was found with T4 and TSH only (p value : <0.001). Table 2 shows the pearson's correlation of FSG with the parameters of thyroid profile. It was found that there was no significant correlation of FSG with any of the parame ters of the thyroid profile.

Table 1: *Comparison of parameters in diabetic patients and healthy controls*

Parameters	Groups		p value
	Controls	**Diabetics**	
Age	54.81± 8.29	56.76 ± 9.94	0.25
Fasting Serum glucose (mg/dl)	90.89 ± 11.01	156.12 ± 47.75	< 0.001**
Serum T3 (nmol/L)	2.09 ± 0.68	1.91 ± 0.73	< 0.16
Serum T4 (nmol/L)	109.50 ± 31.37	78.69 ± 20.69	< 0.001**
Serum TSH (µIU/ml)	2.64 ± 1.19	20.26 ± 22.60	< 0.001**

The values are expressed as their Mean ï SD
***HS – Highly significant (p<0.001)*
**S – Significant (p<0.05)*
NS – Not significant (p>0.05)

Table 2. *Pearson's correlation between FSG and thyroid profile*

Relationship between	r - Values	p – Value	Significance
FSG Vs T3	+ 0.17	0.10	NS
FSG Vs T4	- 0.01	0.47	NS
FSG Vs TSH	-0.08	0.27	NS

r = Pearson's correlation co-efficient.
***HS – Highly significant (p<0.001)*
**S – Significant (p<0.05)*
NS – Not significant (p>0.05)

Discussion

As early as 1968 it was reported that there exists the association of hypothyroidism in diabetic patients [8]. Later studies in 1979 emphasized the importance of screening of diabetic patients to identify hypothyroidism [9, 10]. Now it has been found that thyroid disease and both type 1 and type 2 diabetes mellitus are strongly associated and this has important clinical implications for treatment requirements [11]. Also, diabetes mellitus patients with hypothyroidism are at increased risk for complications like nephropathy. In our study it was found that the prevalence of hypothyroidism was 12.06 % which is in accordance with the studies of Perros et al. (13.4%) and Papazafiropoulou (12.3%). [4, 5] This study also identified the at-risk group with subclinical hypothyroidism. The number of diabetes mellitus patients with subclinical hypothyroidism was found to be 18 (31.03%). These significant percentages emphasize that the diabetic patients to be followed up with thyroid profile. In order to assess the trend this study compared the mean values of thyroid profile between controls and diabetics. It was found that the diabetics showed the trend towards the hypothyroidism. The pathophysiology of thyroid dysfunction in diabetes is still unclear; however thyroid antibodies have been suggested to be the causative factors [12]. Yet to be published re-

view reveals that the cause may be due to the complex interaction of common signaling pathways of insulin modulation and feedback mechanism of thyroid hormones [5]. This study did not show any correlation between fasting sugar levels and parameters of thyroid profile. This may suggests that absence or minimal role of blood sugar concentration in thyroid dysfunction and further studies with glycated hemoglobin may be necessary to find the role of glycemic status in causing thyroid dysfunction. The limitation of this study is, it's a cross sectional study with lesser sample size and hence a follow up study may be required to substantiate the findings. With this study it can be concluded that diabetics are at increased risk for hypothyroidism and their FSG levels do not predict the risk.

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