

Correlation between Hypothyroidism and Diabetes – A Hospital based Study

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ABSTRACT

Introduction: Thyroid diseases and diabetes are one of the most commonly encountered diseases in day to day life. There is a deep rooted relationship between diabetes mellitus and thyroid dysfunctions. Thyroid hormone aids in regulation of pancreatic function and carbohydrate metabolism and diabetes is seen to affect thyroid function at variable levels. Therefore, many times thyroid disorders go undiagnosed owing to the common signs and symptoms. Our present study was conducted to establish a relationship between subclinical hypothyroidism and diabetes mellitus in the hospital, state.

Material and Methods: A hospital based age matched comparative study was undertaken in institute, state. A total of 50 candidates were enrolled in this study. 25 patients with a history of diabetes for less than 5 years were taken as cases and rest 25 patients were normal healthy candidates taken as control. Venous blood was withdrawn from antecubital vein and various parameters like TSH, T₃, T₄, FBS, PPBS etc were estimated.

Results: Results were evaluated using SPSS software.

Conclusion: there is increased prevalence of hypothyroidism amongst diabetic patients. Therefore, regular screening of diabetic patients should be done.

Keywords: Diabetic, Hospital, Hypothyroidism, Subclinical

were taken as cases and rest 25 patients were normal healthy candidates taken as control. Ethical committee clearance was obtained from the institute and all the candidates were informed about the study, a written informed consent was obtained from all. Most of the patients were aged between 40-70 years. Patients below 40 years and above 70 years were not included in the study.

Patients with type 2 diabetes have FBS > 126 mg/dl, PPBS > 200mg/dl or HbA1c > 6.5 gm/dl.⁸ The normal levels of TSH in our body are 1 to 4 mIU/dl, in case of subclinical hypothyroidism the levels are 4 to 10 mIU/dl.⁹

Procedure

Venous blood from the antecubital vein was drawn after a period of overnight fasting. Total 4 ml of blood was withdrawn, 2 ml for fasting blood sugar estimation and 2 ml for thyroid hormone estimation. Blood was centrifuged at 4000 rpm for serum separation and serum creatinine was measured by enzymatic method. After that patient was asked to have normal breakfast and after 2 hours of that another 2 ml of blood was withdrawn for estimating postprandial blood sugar estimation. By electrochemiluminescence method TSH, T₃ and T₄ were estimated. High performance liquid chromatography (HPLC) method was used for Hb1Ac estimation. Cholesterol oxidase method was used for total cholesterol estimation and LDL was measured by direct measurement.

STATISTICAL ANALYSIS

The results were organised in tabulated form and expressed as mean +/- Standard deviation. SPSS software was used for analysis and unpaired t test was applied as a test of significance.

RESULTS

Table 1 shows the results obtained from 50 candidates. The result is expressed as mean +/- SD. The level of FBS, PPBS show a statistically significant difference between the groups, with higher blood sugar levels seen amongst diabetic individuals. The total cholesterol level was also significantly higher in diabetic individuals. The levels of T and T₄ show no significant difference between the case and control groups. Their levels were comparable to each other. The level of serum creatinine

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INTRODUCTION

Coller and Huggins in 1972 were the first to prove association between diabetes and thyroid diseases.¹ Thyroid diseases and diabetes are one of the most commonly encountered diseases in day to day life. There is a deep rooted relationship between diabetes mellitus and thyroid dysfunctions. Approximately 6.6% to 13.4 % of the general population suffers from thyroid diseases and 10 % to 24% of general population is suffering from diabetes.^{2,3} The difference may be attributed to variability in the iodine uptake by people of different areas. Thyroid hormone aids in regulation of pancreatic function and carbohydrate metabolism and diabetes is seen to affect thyroid function at variable levels. Therefore, many times thyroid disorders go undiagnosed owing to the common signs and symptoms. Unmanaged type I and type II diabetes result in a low T₃ state which is characterised by low serum levels of total and free T₃, increase in reverse T₃ but serum T₄ and TSH levels remain the same.⁴ There have been few studies in the past establishing the relationship between thyroid diseases and diabetes.⁵⁻⁷ Our present study was conducted to establish a relationship between subclinical hypothyroidism and diabetes mellitus in the hospital, state.

MATERIAL AND METHODS

A hospital based age matched comparative study was undertaken in institute, state. A total of 50 candidates were enrolled in this study. 25 patients with a history of diabetes for less than 5 years

S. No	parameters	Group I (control)	Group II (Diabetes)	P value
1	Fasting blood sugar (mg/dl)	91.27 +/-12.31	165 +/- 52.75	<0.05
2	Postprandial blood sugar (mg/dl)	160.34 +/- 21.01	223 +/- 72.11	<0.05
3	Total cholesterol (mg/dl)	154 +/- 29.21	198 +/- 49.12	<0.05
4	DL (mg/dl)	46.31 +/-2.1	40.89 +/-12.21	<0.05
5	LDL (mg/dl)	92.36 +/-38.98	116.49 +/- 30.62	<0.05
6	TSH (mIU/ dl)	2.65 +/- 1.44	6.32 +/- 3.42	<0.05
7	T3 (microgm/dl)	0.92 +/- 0.34	0.94 +/- 0.21	>0.05
8	T4 (microgm/dl)	6.22 +/- 2.45	5.99 +/- 2.21	>0.05
9	Hb1Ac (%)	6.03 +/- 0.65	8.64 +/- 1.45	<0.05
10	Serum creatinine (mg/dl)	0.89 +/-0.22	1.11 +/- 0.32	<0.05

Table-1: Lipid, thyroid, diabetes profile in different groups of patients

was also raised in case group and the difference was statistically significant. There was statistically significant difference in the HDL levels between the groups, with HDL being higher in control group. LDL level was markedly high in patients with diabetes.

DISCUSSION

In our study, the level of TSH was significantly higher in case (Diabetes) group. In cases of hypothyroidism there is decrease in glucose absorption from gastrointestinal tract along with increased glucose accumulation and decreased disposal of glucose.¹⁰ In a study conducted by Nobre et al¹¹ around 12.5 % of diabetic patients had thyroid disorders. According to Ashok et al⁷ subclinical hypothyroidism was the most common disorder amongst diabetic patients, in around 7.5 % of total cases. This subclinical hypothyroidism generally leads to dyslipidemia. This clearly evident from our study as the levels of total cholesterol, LDL was raised in diabetic group. Diabetes leads to an increased risk of nephropathy, cerebrovascular accidents, neuropathy, retinopathy etc. Increased amount of dyslipidemia associated with hypothyroidism further exacerbates these complications associated with diabetes. This increases the risk of cardiovascular diseases by 2-4 times amongst diabetics.¹² Increased risk of nephropathy was shown in patients with type 2 diabetes and subclinical hypothyroidism by Chen HS et al.¹³ According to Den Hollander et al¹⁴, there was a case in which treatment of hypothyroidism improved renal function in patients with diabetes.

Many previous studies have categorised clinical and subclinical hypothyroidism as insulin resistant states.^{15,16} Bazrafshan et al¹⁷ in his study found a significant correlation between HbA1c levels and TSH levels. In a study by Ardekani et al¹⁸ the levels of HbA1c were significantly higher in patients with diabetes having thyroid disorders. Undetected hypothyroidism may be the cause of poor management often seen in treated diabetes patients, due to which regular screening of these biochemical markers should be performed so that the disease may not go undetected.

CONCLUSION

According to our study, hypothyroidism was prevalent amongst patients with diabetes. In time and regular screening of all the diabetic patients for thyroid dysfunctions must be performed to manage difficult cases of diabetes.

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