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ASSESSMENT OF THYROID HORMONES IN TYPE 2 DIABETES MELLITUS PATIENTS

Physiology

Dr. Piyushkumar K. Patel 3rd year resident, Department of Physiology, P.D.U Medical College, Rajkot.

Dr. R. S. Trivedi* Professor & Head Department of Physiology, P.D.U. Medical College, Rajkot. *Corresponding Author

Dr. Jagruti K. Patel 3rd year resident, Department of Physiology, P.D.U Medical College, Rajkot.

ABSTRACT

Type 2 diabetes mellitus and thyroid diseases are the two most common endocrine disorders encountered in India. Aim is to assess the thyroid function tests in diabetes mellitus patients and normal healthy volunteers. Comparative study was done on 30 diabetes mellitus patients as cases and 30 normal healthy volunteers as controls.Mean and S.D. of thyroid stimulating hormone (TSH) was significantly higher in the diabetes mellitus group (5.30± 3.24 mIU/dl), when compared to control group (2.72±1.22 mIU/dl). The results also showed elevated total cholesterol, low density lipoprotein (LDL) in diabetes mellitus group, when compared to control group. If the diabetes mellitus patients remain undiagnosed for subclinical hypothyroidism, it can aggravate the risk factors like hypertension and dyslipidemia and can lead to an increased cardiovascular risk in these patients. Thus routine assessment of thyroid hormone level in the early stage of diabetes mellitus will help in the management of diabetes mellitus patients.

KEYWORDS

Type 2 diabetes mellitus, thyroid stimulating hormone, for subclinical hypothyroidism

INTRODUCTION

Thyroid diseases and type 2 diabetes mellitus are the two most common endocrine disorders encountered in clinical practice. Diabetes mellitus and thyroid disorders are shown to mutually influence each other.[1]

There is great variability in the prevalence of Thyroid dysfunction in general population, ranging from 6.6% to 13.4% . The prevalence of hypothyroidism in India is 11%, compared with only 2% in the UK and 4·6% in the USA. In diabetic patients, the prevalence is still greater and varies from 10 to 24% [2,3]

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AIMS & OBJECTIVES

The study was designed to assess the thyroid hormones in diabetes mellitus patients and normal healthy volunteers.

MATERIALAND METHOD

It was cross sectional study done in P.D.U. Medical College and Hospital, Rajkot. Comparative study was done on 30 diabetes mellitus patients as cases and 30 normal healthy volunteers as controls.

Following an explanation about the nature and purpose of the study, those subjects who were willing to participate in the study were included after obtaining written informed consent.

Mean and Standard deviation of the parameters in diabetic profile (FBS, PPBS), thyroid profile (TSH, T3, T4), lipid profile (total cholesterol, LDL, HDL) were calculated for both groups. Statistical analysis was done using student Un- paired t test Graph-Pad prism version 7.

Inclusion criteria

Age: between 30-60 years, Diagnosed as type-2 diabetes mellitus cases of less than 5 years duration, Age and sex matched controls

Exclusion Criteria

Age < 30 years and > 60 years, Known diabetics of duration more than 5 years, Subjects with history of hypothyroidism and chronic illness, Pregnant females for exclusion of gestational diabetes

Type 2 diabetes mellitus, is defined by fasting glucose >126 mg/dl, or post–prandial glucose >200 mg/dl [6].

The normal TSH value used is 1 to 4 mIU/dl. Sub-clinical hypothyroidism is diagnosed, if TSH value is 4 to 10 mIU/dl[7].

nvestigations:

Fasting blood sugar(FBS)
Post prandial blood sugar (PPBS)
Tri-iodothyronine (T3)
Tetraiodothyronine(T4)
Thyroid-stimulating hormone (TSH)
Total cholesterol
Low density lipoprotein (LDL)
High density lipoprotein (HDL)

Collection of blood and blood analysis

2 ml of blood was collected in fluoride vial for estimation of fasting blood glucose and another 2 ml in plain vial for thyroid hormone estimation. It was centrifuged at 4000 rpm for separation of serum. Serum creatinine was measured by enzymatic method. Two ml of venous blood was collected again in fluoride vial 2 hours after the patient has taken his/her regular breakfast for estimation of post prandial blood glucose level. Blood glucose was estimated by Glucose oxidase peroxidase method.

TSH, T3, T4 was estimated by radio immunological method.
Total cholesterol was estimated by cholesterol oxidase method, HDL by direct immuno inhibition method, LDL by direct measurement.

RESULTS & DISCUSSION

TABLE-1: Diabetic profile in control and diabetes mellitus groups

	DIABETIC	CONTROL	P-VALUE
FBS (mg/dl)	175.9 ± 63.55	85.07 ± 11.08	<0.05*
PPBS (mg/dl)	235.9 ± 63.55	155.07±11.08	<0.05*

we can observe in table-1 that Mean and S.D. value of biochemical parameters FBS, PPBS were significantly higher among the cases (diabetes mellitus group) when compared to control group. (p-value <0.05)

TABLE-2: Thyroid profile in control and diabetes mellitus groups.

	DIABETIC	CONTROL	P-VALUE
TSH (mIU/dl)	5.30 ± 3.24	2.72 ± 1.22	<0.05*
T3 (µg/dl)	0.90 ± 0.15	0.89 ± 0.51	NS
T4 (µg/dl)	5.96 ± 2.33	5.45 ± 0.32	NS

We can observe in table-2 that TSH was higher in the diabetes mellitus group when compared to control group (p value <0.05). However T3 and T4 levels were similar in both the groups. (p value is not significant).

TABLE-3: Lipid profile in control and diabetes mellitus groups.

	DIABETIC	CONTROL	P-VALUE
Total cholesterol (mg/dl)	195.9±53.01	152.8±14.02	<0.05*
LDL (mg/dl)	120.17±41.02	91.24±24.27	<0.05*
HDL (mg/dl)	40.51±0.42	46.02±4.47	<0.05*

We can observe in table-3 that total cholesterol and LDL were significantly higher among the cases (diabetes mellitus group) when compared to control group.

The High density lipoprotein (HDL) was significantly lower in cases when compared to control group.

Patients with diabetes mellitus are more prone to have complication when hypothyroidism associates with diabetes which is in agreement with the findings of many researchers.[2]

It is well known that increase in FBS and PPBS leads to abnormal glycaemia and dyslipidemia. This causes increased risk of micro and macro-vascular complications such as nephropathy, retinopathy, neuropathy, coronary artery disease, cerebrovascular disease and peripheral vascular disease. This atherogenic lipoprotein profile contributes to 2–4 fold excess risk of cardiovascular disease in diabetics[8]

A study involving subjects from a Chinese population found a higher TSH level in patients with metabolic syndrome compared to that in the non-metabolic syndrome group suggesting that subclinical hypothyroidism may be a risk factor for metabolic syndrome [9].

Furthermore, an increased risk of nephropathy was shown in type 2 diabetic patients with subclinical hypothyroidism which could be explained by the decrease in cardiac output and increase in peripheral vascular resistance seen with hypothyroidism and the resulting decrease in renal flow and glomerular filtration rate [10,11].

Study by Yang et al. demonstrated that diabetic patients with subclinical hypothyroidism have more severe retinopathy than euthyroid patients with diabetes [12].

CONCLUSION

According to our study, hypothyroidism was common amongst patients with diabetes.

If the diabetes mellitus patients remain undiagnosed for subclinical hypothyroidism, it can aggravate the risk factors such as hypertension and dyslipidemia arising from an thyroid dysfunction and can lead to an increased cardiovascular risk in these patients.

The result suggest routine assessment of thyroid hormone level in addition to other biochemical parameters in the early stage of diabetes mellitus will help to manage difficult cases of diabetes.

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