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A prospective study of Pregnant women with thyroid dysfunction and in diabetes mellitus patients

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ABSTRACT

Diabetes Mellitus (DM) is a common endocrine disorder in the world and its prevalence of thyroid dysfunction is increasing at the same time as insulin secretion is controlled by the thyroid hormone. Reduction in glucose-induced insulin secretion by beta cells is observed in hypothyroidism, and the insulin resistance will be increased in thyrotoxicosis. subclinical hypothyroidism in Diabetes mellitus patients are at risk of complications like neuropathy and cardiovascular events. Hence, there is a need to detect subclinical hypothyroidism in diabetic patients. 50 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. The results showed a significant difference among the controls and the patients. It may be concluded from this study that there is urge to screen thyroid disorders in DM patients in order to avoid the further complications..

Keywords: Diabetes Mellitus (DM), Insulin Resistance, Thyroid Stimulating Hormone

INTRODUCTION

One of the most important endocrine disorder is Diabetes Mellitus leading to morbidity and mortality due to involvement of multiple organ systems. It is metabolic syndrome having disturbance in carbohydrate, protein and fat metabolism causing deficiency in the action or secretion of insulin^[1].According to WHO, the prevalence of diabetes was 2.8% during the year 2000 and by 2030, it increases almost to 4.4% and total number of persons increases from 171 millions to 366 millions between 2000 to 2030^[1-5].

Thyroid is also one of the most endocrine disorder after diabetes. A number of studies estimated the prevalence thyroid dysfunction in diabetes from 1979^[6]. Sedentary lifestyle, hypertension, dietary indiscretions, ethnicity and obesity are some of the factors thought to be major contributions^[7]. Functions of thyroid hormone are mainly affected at 2 sites by diabetes mellitus. First at the level of release of TSH by hypothalamic control and secondly by converting T4 to T3 at peripheral tissues^[8].

Secretion of insulin is mainly controlled by thyroid hormones. Reduction in glucose induced insulin secretion by beta cells is observed in thyroid hormones whereas catecholamines are increased in hyperthyroidism and insulin resistance will also be increased^[9-11]. Some studies suggested Diabetes mellitus is detected with subclinical hypothyroidism in order to avoid further complications. Abnormalities of Thyroid hormone are frequently associated with diabetes and unidentified thyroid dysfunction which could negatively impact diabetes and its complications^[12]. Hence the study was designed to assess thyroid dysfunction in Diabetes mellitus patients.

AIMS AND OBJECTIVES

To assess the Fasting Blood sugar to find diabetic status.

To estimate the thyroid hormones like T3, T4 and TSH and estimate the prevalence of thyroid dysfunction in Diabetes Mellitus patients.

MATERIALS AND METHODS

A prospective cohort study was conducted on individuals between the age group of 35-60 years who attended the Madha Medical college and Hospital, Chennai, Tamilnadu and Great Eastern Medical school and Hospital. Study group consists of 50 individuals who were diagnosed as Diabetes without any other complications and controls as sex matched healthy individuals.

Inclusion criteria-

Patients with Diabetes mellitus at least 1 year prior to the study.

Age & Sex matched healthy controls

Exclusion criteria-

Individuals with hepatobiliary disease, pregnancy, previous history of thyroid disease, on drug therapy like thyroxine, antithyroid drugs, glucocorticoids and oral contraceptives are taken as exclusion criteria

All the patients were instructed for at least 12 hours overnight fasting and the 7ml of venous blood will be collected before breakfast for the fasting blood glucose and thyroid profile. After collecting the blood from the patients, 5ml of blood was transferred into plain tubes for thyroid and 2ml of blood was into sodium fluoride tubes for blood glucose estimation. The blood glucose estimation was done by GOD-POD method

The study was approved by the institutional ethical committee and informed consent was taken from the patients and healthy controls.

Diabetes was defined as per the American Diabetes Association criteria (Fasting plasma

sugar ≥ 126 mg/dl, postprandial blood sugar ≥ 200 or Glycated hemoglobin [HbA1c] $\geq 6.5\%$) [ADA]. Serum T3 Serum T4, Serum TSH was measured by CLIA method in Mindray (TL916) full automated analyzer.

Guidelines for detection of thyroid dysfunction

- Normal – when T3, T4, and TSH were in normal range
- Primary Hypothyroidism – when TSH more than 5.5 mIU/ml and T3, T4 less than normal.
- Primary Hyperthyroidism – when TSH is less than 0.3 mIU/ml and T3, T4 more than normal.
- Subclinical Hypothyroidism – when TSH is more than 5.5 mIU/ml and T3, T4 is within normal range.
- Subclinical Hyperthyroidism – when TSH is less than 0.3 mIU/ml and T3, T4 is within normal range.

STATISTICAL ANALYSIS

The results obtained and expressed in mean \pm SD. The comparison was done by student t-test and each parameter was done by SPSS statistical package version 18.0. p-value < 0.05 was considered statistically significant.

RESULTS

The sex and age distribution of diabetic and nondiabetic patients was as per Table - 1. DM patients included 20 males and 30 females whereas nondiabetic patients included 15 males and 35 females with a mean age of 43.02 ± 6.08 and 44.37 ± 6.19 respectively.

Table - 1: Sex and age wise distribution of cases and controls.

Groups N= 100	Male	Female	Mean age in years
Cases (n=50)	20	30	43.02 ± 6.08
Controls (n=50)	15	35	44.37 ± 6.19

Table 2: Mean \pm SD of both cases and controls

Parameters	Cases	Controls	P value
T3	1.27 ± 0.62 nmol/L	1.62 ± 0.54	< 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
FBS	170 ± 10 mg/ dl	93 ± 13 mg/dl	< 0.005

T3 and T4 levels are low in cases when compared to controls where as TSH levels are increases in cases when compared to controls. Fasting blood sample is more in case of diabetic patients than normal healthy subjects.

DISCUSSION

In Patients with DM , insulin resistance is typically seen as it plays a major role in thyroid dysfunction . this study showed that serum T3 and T4 levels were low and serum TSH levels were increased in diabetic patients when compared to controls. Our findings are similar to the study of Jusufovics S, et al. showed that patients had abnormal thyroid hormone levels in type 2 diabetes. The level of T3, T4, FT3, and FT4 were significantly lower while the levels of TSH were significantly higher in type 2 diabetics as compared to non-diabetics^[13].

Hypothyroidism was more common among our study subjects compared to the controls which has been also documented by Saha et al. Alterations in hypothalamus pituitary thyroid axis is observed in diabetes. Structural changes in thyroid and pituitary glands are observed with marked alterations in their secretory activities.

Insulin antagonists like Iodothyronines with high levels being diabetogenic whereas absence of the hormone inhibits the development of diabetes. Stress is one of the cause leading to changes in the hypothalamus anterior pituitary axis in diabetes^[14].

In our study, out of 35% , 12 patients had reported as hypothyroidism and 3 reported as subclinical hyperthyroidism and this is similar to the study of Sawant A.M et al . according to him, 10.3% shows hypothyroidism and 1.7% as hyperthyroidism^[15].

CONCLUSION

Present study shows that serum TSH is increased in DM patients whereas T3 & T4 levels were decreased in DM compared to controls. As prevalence of thyroid dysfunction increases, there is a need for routine assay of thyroid hormones in diabetic which helps us in the early detection and treatment of thyroid dysfunction which improves quality of the life and reduces morbidity in diabetic patients.

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