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Thyroid Hormone Dysfunctions in Type 2 Diabetic Patients in Urban Areas of Manipur

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ABSTRACT: *Diabetic patients have higher prevalence of thyroid disorders than the normal population, this may influence diabetic management. The study was conducted in 160 subjects who lived in urban areas of Manipur. Out of 160 subjects, 80 were known type 2 diabetic patients and 80 were taken as control. Blood samples were collected in the morning between 9 to 10 a.m. Glucose level, Glycosylated haemoglobin and thyroid hormone levels (T3, T4 and TSH) were estimated as well as Age, weight, sex, height and BMI of both control and diabetic patients were also recorded. All the diabetic patients had high glycoslylated haemoglobin. The serum T3 level of type 2 diabetic patients had significantly reduced as compared to the control whereas no significant differences were observed in T4 and TSH levels. This study observed that the abnormal thyroid hormone level was mostly associated in type 2 diabetic subjects as compared to control.*

KEY WORDS: *Type 2 diabetes, Thyroid disorder, T3, T4 and TSH.*

I. INTRODUCTION

Type 2 DM is a heterogeneous group of disorders characterized by variable degrees of insulin resistance, impaired insulin secretion and increased glucose production. Distinct genetic and metablolic defects in insulin action and secretion give rise to the common phenotypes of hyperglycemia in type 2 Diabetes (1). Occasionally the endocrine disorders, such as thryroid abnormalities are associated with Diabetes (2, 3). Since, thyroid hormones are involved in cellular metabolism, excess or deficit of these hormones can result in functional derangement of cell (4, 5). Various workers reported different Prevalence rate of thyroid hormone disorders in type 2 diabetes. Since the prevalence rate of hypo or hyperthyroidism in various countries was differed, the prevalence rates of thyroid dysfunction in diabetes still remain controversial. Moreover not many studies have been done in thyroid dysfunction in type 2 diabetes in Manipur, therefore this study was carried out in the department of Physiology, RIMS, Imphal to evaluate the thyroid disorders in type 2 diabetic patients who lived in urban areas of Manipur.

II. MATERIALS AND METHODS

This study was cross sectional and conducted in 160 subjects in the department of Physiology in collaboration with Medicine Department, RIMS, Imphal after getting approval from the institutional ethical committee, RIMS. Blood samples were collected in the morning in between 9 to 10 a.m. from 80 diagnosed type 2 diabetic patients and 80 non diabetic subjects. Each subject was selected who had no previous history of thyroid disorders and excluded who had diabetic complications. Age, sex, height, weight and BMI were recorded. The serum thyroid stimulating hormone (TSH), total triiodothyronine (T3) and total thyroxine (T4) were also measured by using Lisa Scan EM. Then, Blood glucose was tested by ACCU-CHEK active whereas Glycosylated haemoglobin (HbA1C) was determined by Bayer's Multitest A1C System. All datas were expressed as mean ± SEM and statistical significance was evaluated by Student's t-test using SPSS version 17.0 Software.

III. RESULTS

Age, sex, height, weight and BMI of control and diabetic subjects were shown in table 1. Control and diabetic subjects were included 80 subjects each.

Table 1: Demographic profile of study subjects

Groups	Age (years)	Sex		Height (cm)	Weight (kg)	BMI (kg/m^2)
		Male	Female			
Control	45.48±1.43	29	51	157.30±0.47	59.45±0.45	24.23±1.27
Diabetic subjects	49.21±2.41	25	55	158.09±1.51	57.17±2.12	24.56±3.20

All values are expressed as mean ± SEM.

The level of serum thyroid hormones in control and diabetic subjects are shown in Table 2. The serum T3 level was significantly decreased in diabetic subjects as compared to control while level of serum T4 and TSH was not significantly different in diabetic subjects as compare to control. The percentage of glycosylated haemoglobin (HbA1c) in diabetic subjects was found significantly higher than control.

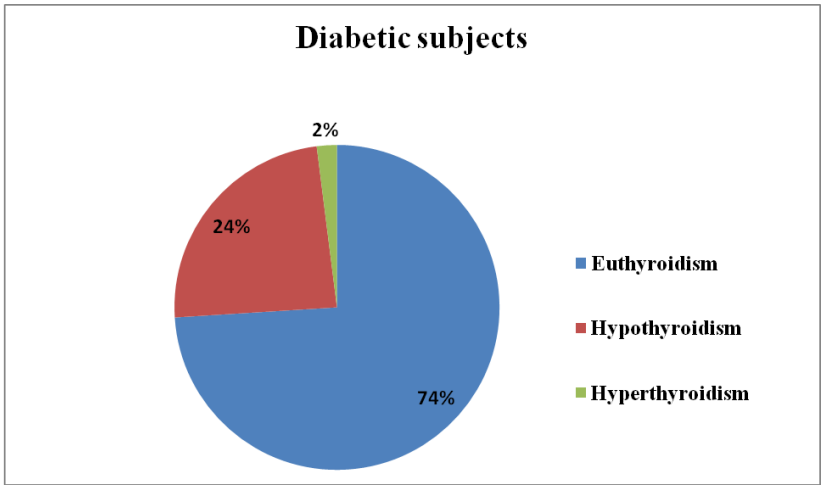
Table 2: Comparison between control and diabetic subjects

Parameters		Control	Diabetic subjects
T3 (ng/ml)		1.81±0.15	1.30±0.11*
T4 (µg/dl)		8.80±0.34	8.73±0.81
TSH (mIU/L)		2.89±0.18	3.30±0.23
HbA1C (%)		5.14±0.13	8.32±0.15*
Glucose (mg/dl)	**Fasting**	81.23±09.28	195.87±14.23*
	Random	100.9±15.18	273.4±24.05*

All values are expressed as mean ± SEM. *p<0.05
Normal range for T3 is 0.69-2.02 ng/ml, T4 is 4.4-11.6 µg/dl and TSH is 0.3-4.0 mIU/L

Fig. 1 shows the distribution of euthyroidism, hypothyroidism and hyperthyroidism in diabetic patients. The present study observed that 74% of diabetic patients were euthyroidism, 24% hypothyroidism and 2% hyperthyroidism.

Fig. 1 - Percentage distribution of Euthyroidism, Hypothyroidism and Hyperthyroidism.



IV. DISCUSSION

Out of 80 diabetic subjects, investigated 24% had low levels of thyroid hormone and 74% had euthyroidism. All the control showed euthyroid status. These findings showed a high incidence of hypothyroidism in type 2 diabetic patients in Manipur. Our observations is in agreement with the report of Smithson (6), Suzuki *et al* (7) and Celani *et al* (8) found altered thyroid hormone levels of different magnitudes in diabetic patients.

The thyroid hormones, tri-iodothyronine (T3) and tetraiodothynine (T4) are insulin antagonists that also potentiate insulin action indirectly (9). TRH synthesis also decreases in diabetes mellitus (7,10). These could be responsible for the occurrences of low thyroid hormone levels in some diabetics.The mean serum T3 in diabetes was significantly lower than the control. However, the T4 and TSH levels were not significantly different between the patient and control group. Our Study result correlates with the findings of *Schlienger et al* (11) who showed a significant decrease in T3 levels in type 2 diabetic patients. Diabetic control was assessed by the glycosylated haemoglobin (HbA1c) which indicates poor glycaemic control in diabetic patients. Abnormal thyroid hormones in diabetes may also depend on the glycaemic status of the diabetic patients. Glycaemic status is influenced by insulin, which modulates the Thyrotropin-releasing hormone **(**TRH) and thyroid stimulating hormone (TSH) level (12, 13). It has also been reported that abnormal thyroid hormone level found in diabetes is due to the presence of thyroid hormone binding inhibitor (THBI) which is an inhibitor of the extra thyroidal conversion enzyme of T4 to T3, and also due to the dysfunction of hypothalamic-pituitary-thyroid axis (14).

V. CONCLUSION

In this study, abnormal thyroid hormone functions were observed in type 2 diabetic patients. Early detection of abnormal thyroid hormone levels and other bio-chemical variables will be helpful for the management in type 2 diabetes. This is a preliminary study in urban areas of Manipur where only few cases have been examined. Therefore, further study is needed.

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