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Thyroid function in type 2 diabetes mellitus patients without nephropathy and with nephropathy

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ABSTRACT

Background: To compare thyroid function in patients of type 2 diabetes mellitus without nephropathy and type 2 diabetes mellitus with nephropathy.

Material and Methods: 80 patients of type 2 diabetes mellitus were divided into group I (without nephropathy) and group II (with nephropathy). Thyroid function between both groups was obtained and compared.

Results: Group I comprised of 26 males and 14 females and group II 22 males and 18 females. Thyroid level was normal in 28 in group I and 19 in group II, low T3 syndrome in 6 in group I and 10 in group II, subclinical hypothyroidism in 3 in group I and 6 in group II and overt hypothyroidism in 3 in group I and 5 in group II. The difference was significant ($P< 0.05$). There was correlation of TSH with SCr, eGFR and UACR in group II ($P< 0.05$).

Conclusion: Thyroid dysfunction was more prevalent in patients with diabetic nephropathy. Hence there is a need for assessment of thyroid hormones in type 2 diabetics and diabetic nephropathy in order to improve the quality of life and reduce the morbidity.

Keywords: Diabetes Mellitus, Thyroid function, morbidity, Nephropathy.

INTRODUCTION

Diabetes mellitus (DM) is a common metabolic disease characterized by hyperglycemia and metabolic disturbances of carbohydrates, proteins, and lipids principally caused by pancreatic β-cell dysfunction, hyperglucagonemia, and increased renal glucose reabsorption. DM is rapidly becoming one of the major health problems worldwide. The estimated global prevalence of DM was 2.8% in 2000 and was predicted to increase to 4.4% in 2030.[1]

Thyroid hormones are insulin antagonists, both insulin and thyroid hormones are involved in cellular metabolism. Excess or deficit of any one can result in functional derangement of the other. Sub–clinical hypothyroidism is an independent risk factor for development of diabetic nephropathy.[2] Serum TSH and tissue insulin sensitivity have important effects on serum lipid parameters in type 2 diabetic patients. At low insulin sensitivity, relatively minor changes in TSH levels are associated with marked changes in lipid risk factors and thus cardiovascular risk. A higher proportion of individuals with type 2 diabetes are found to have diabetic nephropathy shortly after the diagnosis of their diabetes, because of the unnoticed presence of diabetes for many years before its diagnosis.[3] Subclinical hypothyroidism is the most prevalent form of thyroid dysfunction in type 2 DM. Genetic and environmental factors are

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related to the prevalence of diabetes and the effects of potential risks on the processes of diabetic complications; although the mechanisms still remain unclear, the geographical variabilities in manifestations exist.[4] However, achieved effects on the prevalence and the prognosis of DN are not satisfactory. Therefore, it is necessary to explore the underlying pathogenesis and potential management of DN.[5] The present study was conducted to assess thyroid function in type 2 diabetes mellitus patients without nephropathy and with nephropathy.

MATERIAL & METHODS

The present study comprised of 80 type II diabetes mellitus patients of both genders. The study was approved from institutional ethical review and clearance committee. All patients agreed with their written consent for the participation in the study.

Demographic profile of each patient was recorded in case sheet. We classified patients into 2 groups of 40 each. Group I were type II DM patients without diabetic nephropathy and group II were type II DM patients with diabetic nephropathy. A detailed history and clinical examination were carried out. 5 ml of venous blood sample was drawn by aseptic technique from all patients and various lab investigations such as thyroid function tests, blood sugar fasting and postprandial, HbA1c, serum insulin levels, serum creatinine, and urinary albumin creatinine ratio was performed under aseptic conditions. Data thus obtained were subjected to statistical analysis using SPSS version 21.0. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Status	Without diabetic nephropathy	With diabetic nephropathy
M:F	26:14	22:18

Group I comprised of 26 males and 14 females and group II 22 males and 18 females (Table I).

Table II Thyroid dysfunction in both groups

Thyroid Dysfunction	Group I	Group II	P value
Normal	28	19	0.01
Low T3 syndrome	6	10	
Subclinical Hypothyroidism	3	6	
Overt Hypothyroidism	3	5	

Thyroid level was normal in 28 in group I and 19 in group II, low T3 syndrome in 6 in group I and 10 in group II, subclinical hypothyroidism in 3 in group I and 6 in group II and overt hypothyroidism in 3 in group I and 5 in group II. The difference was significant (P< 0.05) (Table II).

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Table III Correlations between thyroid function and nephropathy

TSH	Group I		Group II	
	r	p	r	p
SCr	-0.134	0.15	0.032	0.02
eGFR	-0.028	0.46	-0.036	0.01
UACR	-0.017	0.87	0.035	0.03

There was correlation of TSH with SCr, eGFR and UACR in group II (P< 0.05) (Table III)

DISCUSSION

Diabetes Mellitus is an important health problem affecting major population worldwide. It is characterized by absolute or relative deficiency in insulin secretion and/or insulin action associated with chronic hyperglycemia and disturbances of carbohydrate, lipid and protein metabolism.[6] Thyroid hormones are essential for metabolism and energy homeostasis and participate in insulin action and glucose regulation.[7] Research reported higher prevalence rates of thyroid disorders in diabetic patients compared with nondiabetic individuals, and overt hypothyroidism was frequently observed in type 2 diabetes mellitus (T2DM).[8] Moreover, subclinical hypothyroidism (SCH), a pathological status defined as an elevated serum thyroid stimulating hormone (TSH) value with normal concentrations of free thyroid hormones, is receiving increasing concerns in recent years.[9,10] The present study was conducted to assess thyroid function in type 2 diabetes mellitus patients without nephropathy and with nephropathy.

Our results showed that group I comprised of 26 males and 14 females and group II 22 males and 18 females. Rai et al[11] compared the levels of thyroid hormones, serum creatinine, glycated haemoglobin and urine microalbumin between type 2 diabetics without any complications, type 2 diabetics with nephropathy and age and sex matched normal controls. The mean serum T3 level in type 2 diabetics without any complications was 91.27 ± 14.56 ng/dl, in type 2 diabetics with nephropathy was 88.5320 ± 30.87 ng/dl and in controls was 134.98 ± 28.55 ng/dl. The mean serum T4 level in type 2 diabetics without any complications was 7.73 ± 1.42 µg/dl, in type 2 diabetics with nephropathy was 7.25 ± 2.72 µg/dl and in controls was 8.61 ± 1.73 µg/dl. The mean serum TSH level in type 2 diabetics without any complications was 3.99 ± 1.87 µIU/ ml, in type 2 diabetics with nephropathy was 4.27 ± 1.62 µIU/ml and in controls was 2.07 ± 1.09 µIU/ml. Correlations between T3, T4, TSH with serum creatinine, glycated haemoglobin was not statistically significant in type 2 diabetes without any complications and diabetic nephropathy. They found a statistically significant correlation between T3 and urine microalbumin in patients with diabetic nephropathy.

Our results demonstrated that thyroid level was normal in 28 in group I and 19 in group II, low T3 syndrome in 6 in group I and 10 in group II, subclinical hypothyroidism in 3 in group I and 6 in group II and overt hypothyroidism in 3 in group I and 5 in group II. Zhao et al[12] included 103 healthy volunteers, 100 T2DM patients without DN, and 139 with DN. Patients with DN had higher thyroid stimulating hormone (TSH) levels and lower free T3 (FT3) levels than those without DN ($p < 0.01$). The prevalence of SCH and low FT3 syndrome in patients with DN was 10.8% and 20.9%, respectively, higher than that of controls and patients without DN ($p < 0.05$). Through Pearson correlation or Spearman rank correlation analysis, in patients with DN, there were positive correlations in TSH with serum creatinine ($r = 0.363$, $p = 0.013$) and urinary albumin-to-creatinine ratio ($r = 0.337$, $p = 0.004$), and in FT3 with estimated glomerular filtration rate (eGFR) with statistical significance ($r = 0.560$, $p < 0.001$).

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Our results revealed that there was correlation of TSH with SCr, eGFR and UACR in group II ($P< 0.05$). Singh et al[13] found that TSH levels were positively correlated with serum insulin levels. Sharma et al[14] divided 100 patients with type 2 DM into group 1 (type 2 DM without nephropathy) and group 2 (type 2 DM with nephropathy). Thyroid dysfunction was more prevalent in diabetic nephropathy group as compared to diabetic without nephropathy group. They found a statistically significant correlation between TSH and serum insulin levels in patients with diabetic and diabetic nephropathy. Higher prevalence of thyroid dysfunction like low T3 syndrome and subclinical hypothyroidism was found in women as compared to men. Rajeswari et al[15] found that TSH levels were positively correlated with insulin in patients with subclinical hypothyroidism (SCH). Islam S et al[16] showed that the levels of FT3 was significantly lower in type 2 diabetics when compared with the controls. FT4 and TSH did not show any statistically significant difference between type 2 diabetics and controls. The mean serum ratio of FT3/FT4 was significantly lower in type 2 diabetics than in the control group.

CONCLUSION

Thyroid dysfunction was more prevalent in patients with diabetic nephropathy. Hence there is a need for assessment of thyroid hormones in type 2 diabetics and diabetic nephropathy in order to improve the quality of life and reduce the morbidity.

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