

## Original Research

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

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#### ABSTRACT:

**Background:** A significant health issue impacting a sizable portion of the global population is diabetes mellitus. The present study compared thyroid function in patients of type 2 diabetes mellitus without nephropathy and type 2 diabetes mellitus with nephropathy. **Materials & Methods:** 90 patients of type 2 diabetes mellitus were divided into group I (without nephropathy) and group II (with nephropathy). Thyroid function in both groups was compared. **Results:** Group I comprised 26 males and 19 females and group II 22 males and 23 females. Thyroid level was normal in 30 in group I and 23 in group II, low T3 syndrome in 8 in group I and 15 in group II, subclinical hypothyroidism in 4 in group I and 5 in group II and overt hypothyroidism in 3 in group I and 1 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:** The prevalence of thyroid dysfunction was higher in patients with diabetic nephropathy. Therefore, in order to enhance quality of life and lower morbidity, thyroid hormone assessment in type 2 diabetics and diabetic nephropathy is necessary.

**Key words:** Diabetes Mellitus, Thyroid function, morbidity, Nephropathy

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#### INTRODUCTION

A significant health issue impacting a sizable portion of the global population is diabetes mellitus. It is characterized by an absolute or partial lack of insulin secretion and/or action, together with chronic hyperglycemia and abnormalities in the metabolism of carbohydrates, lipids, and proteins.<sup>1</sup> Thyroid hormones play a role in insulin action and glucose regulation and are crucial for metabolism and energy homeostasis. The prevalence of thyroid abnormalities was shown to be greater in diabetic patients compared to non-diabetics, and overt hypothyroidism was frequently seen in people with type 2 diabetes mellitus (T2DM).<sup>2</sup>

Genetic and environmental factors are 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.<sup>3</sup> 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.<sup>4</sup>

Insulin and thyroid hormones are both involved in cellular metabolism, and thyroid hormones are insulin antagonists. Functional derangement of the other can occur when one is excessive or lacking. An independent risk factor for the development of diabetic nephropathy is subclinical hypothyroidism.<sup>5</sup> Serum lipid parameters in type 2 diabetic patients are significantly impacted by serum TSH and tissue insulin sensitivity. When insulin sensitivity is low, even relatively small changes in TSH levels can cause significant changes in lipid risk factors, raising the risk of cardiovascular disease.<sup>6</sup> Because type 2 diabetes often goes undiagnosed for many years before it is discovered, a higher percentage of people with type 2 diabetes are later found to have diabetic nephropathy. Subclinical hypothyroidism is the most prevalent form of thyroid

dysfunction in type 2 DM.<sup>7</sup> The present study was conducted to assess thyroid function in type 2 diabetes mellitus patients without nephropathy and with nephropathy.

**MATERIALS & METHODS**

The present study consisted of 90 type II diabetes mellitus patients of both genders. All patients agreed with their written consent for participation in the study.

Data such as name, age, gender etc. was recorded in case file. A detailed history and clinical examination

were carried out. Patients were classified into 2 groups of 45 each. Group I were type II DM patients without diabetic nephropathy and group II were type II DM patients with diabetic nephropathy. 5 ml of venous blood sample was drawn from all patients and subjected to measurement of thyroid function tests, blood sugar fasting and postprandial, HbA1c, serum insulin levels, serum creatinine, and urinary albumin creatinine ratio. Data thus obtained were subjected to statistical analysis. 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	26:19	22:23

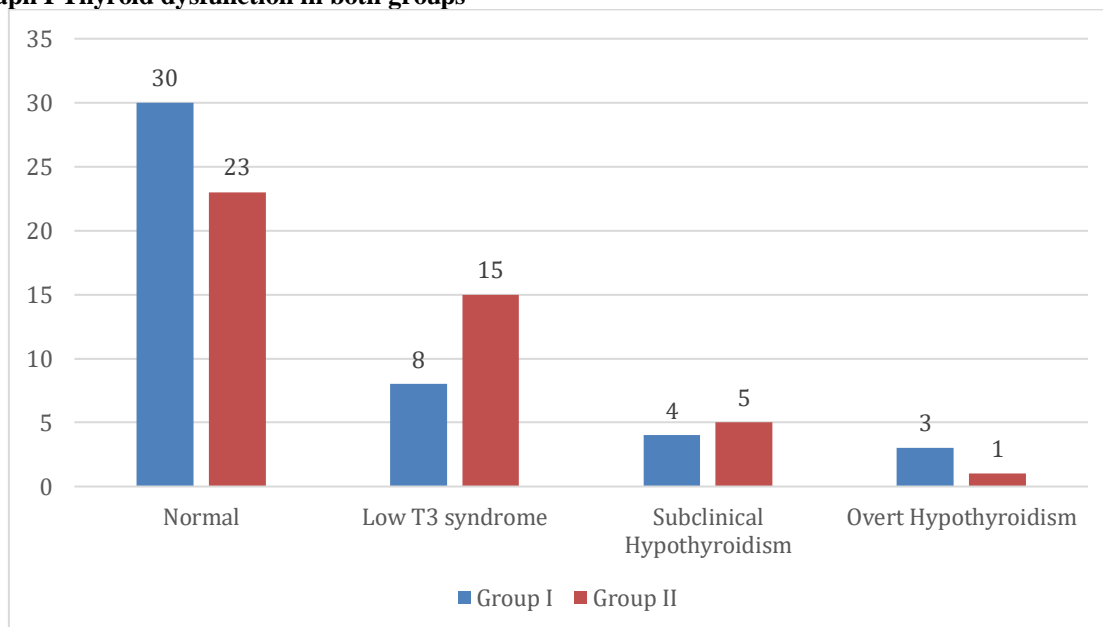
Table I shows that group I comprised 26 males and 19 females and group II 22 males and 23 females.

**Table II Thyroid dysfunction in both groups**

Thyroid dysfunction	Group I	Group II	P value
Normal	30	23	0.01
Low T3 syndrome	8	15	
Subclinical Hypothyroidism	4	5	
Overt Hypothyroidism	3	1	

Table II shows that thyroid level was normal in 30 in group I and 23 in group II, low T3 syndrome in 8 in group I and 15 in group II, subclinical hypothyroidism in 4 in group I and 5 in group II and overt hypothyroidism in 3 in group I and 1 in group II. The difference was significant (P< 0.05).

**Graph I Thyroid dysfunction in both groups**



**Table III Correlations between thyroid function and nephropathy**

TSH	Group I		Group II	
	r	p	r	p
SCr	-0.131	0.56	0.035	0.04
eGFR	-0.025	0.73	-0.037	0.02
UACR	-0.019	0.81	0.031	0.05

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

## DISCUSSION

Diabetes mellitus (DM) is a prevalent metabolic disorder marked by hyperglycemia and metabolic abnormalities of carbohydrates, proteins, and lipids. Pancreatic beta-cell failure, hyperglucagonemia, and increased renal glucose reabsorption are the main causes of DM. DM is quickly rising to the top of the list of global health issues.<sup>8,9</sup> In 2000, there was an estimated 2.8% global prevalence of DM, and by 2030, that incidence was expected to reach 4.4%. 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.<sup>10,11</sup> The present study was conducted to assess thyroid function in type 2 diabetes mellitus patients without nephropathy and with nephropathy.

We found that group I comprised 26 males and 19 females and group II 22 males and 23 females. Zhao et al<sup>12</sup> comprised 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. 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 ( $r = 0.560$ ,  $p < 0.001$ ).

We found that thyroid level was normal in 30 in group I and 23 in group II, low T3 syndrome in 8 in group I and 15 in group II, subclinical hypothyroidism in 4 in group I and 5 in group II and overt hypothyroidism in 3 in group I and 1 in group II. 100 patients with type 2 diabetes were split into two groups, group 1 (type 2 DM without nephropathy) and group 2 (type 2 DM with nephropathy), by Sharma et al.<sup>13</sup> When compared to diabetics without nephropathy, the group with diabetic nephropathy had a higher prevalence of thyroid dysfunction. Patients with diabetes and diabetic nephropathy showed a statistically significant correlation between TSH and serum insulin levels. Women were found to have a higher prevalence of thyroid dysfunction than men, including low T3 syndrome and subclinical hypothyroidism. TSH levels and insulin were found to be positively correlated in patients with subclinical hypothyroidism (SCH) by Rajeswari et al.<sup>14</sup>

We found that there was correlation of TSH with SCr, eGFR and UACR in group II ( $P < 0.05$ ). Rai et al<sup>15</sup> found that the mean serum T3 level in type 2 diabetics without any complications was  $91.27 \pm 14.56$  ng/dl, in type 2 diabetics with nephropathy was  $88.5320 \pm 30.87$  ng/dl and in controls was  $134.98 \pm 28.55$  ng/dl.

The mean serum T4 level in type 2 diabetics without any complications was  $7.73 \pm 1.42$  µg/dl, in type 2 diabetics with nephropathy was  $7.25 \pm 2.72$  µg/dl and in controls was  $8.61 \pm 1.73$  µg/dl. The mean serum TSH level in type 2 diabetics without any complications was  $3.99 \pm 1.87$  µIU/ml, in type 2 diabetics with nephropathy was  $4.27 \pm 1.62$  µIU/ml and in controls was  $2.07 \pm 1.09$  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.

## CONCLUSION

The prevalence of thyroid dysfunction was higher in patients with diabetic nephropathy. Therefore, in order to enhance quality of life and lower morbidity, thyroid hormone assessment in type 2 diabetics and diabetic nephropathy is necessary.

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