

ORIGINAL RESEARCH

Evaluation of thyroid function in people with type 2 diabetes without nephropathy and type 2 diabetes with nephropathy

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ABSTRACT

Background: Diabetes Mellitus is an important health problem affecting major populations worldwide. The purpose of this study was to find out how well the thyroid works in people with type 2 diabetes mellitus with or without nephropathy.

Materials and Methods: Group I did not have any diabetic nephropathy patients, and Group II did not have any diabetic nephropathy patients. All patients were subjected to a detailed history and clinical examination,

Moreover, 5 ml of venous blood was drawn by aseptic technique and various lab investigations, such as thyroid function tests, were done.

Results: Group I had 16 males and 14 females, and Group II had 15 males and 15 females. Thyroid function in group I and group II was normal in 21 and 15, low T3 syndrome in 5 and 6, subclinical hypothyroidism in 3 and 5, and overt hypothyroidism in 2 and 4, respectively. The difference was significant ($P < 0.05$). There was a 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.

Keywords: Diabetes Mellitus, Thyroid function, Subclinical hypothyroidism

INTRODUCTION

Diabetes Mellitus is an important health problem affecting major populations worldwide. It is characterized by an absolute or relative deficiency in insulin secretion and/or insulin action and is associated with chronic hyperglycemia and disturbances of carbohydrate, lipid, and protein metabolism. ¹ 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.² Subclinical hypothyroidism is the most prevalent form of thyroid dysfunction in type 2 DM. Although genetic and environmental factors are related to the prevalence of diabetes and the effects of potential risks (such as thyroid dysfunction) on the processes of diabetic complications; although the mechanisms remain unclear, the geographical variabilities in manifestations exist.³

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. Diabetic nephropathy (DN) is a chronic microvascular complication of diabetes and is one of the main causes of renal failure, which shortens lifespan and aggravates healthcare burdens.⁴ However, the 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 purpose of this study was to find out how well the thyroid works in people with type 2 diabetes mellitus with or without nephropathy.

MATERIALS AND METHODS

The present study was comprised of 60 patients with diabetes mellitus of both genders. All gave their written consent for participation in the study.

Names, ages, gender, and other information were recorded. Patients in Group I had no diabetic nephropathy, while patients in Group II had diabetic nephropathy. All patients were subjected to a detailed history and clinical examination, and 5 ml of venous blood was drawn by aseptic technique, 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 were done.

The data thus obtained was subjected to statistical analysis. A 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	16:14	15:15

Table I shows that group I had 16 males and 14 females, and group II had 15 males and 15 females.

Table II Assessment of thyroid dysfunction in both groups

Thyroid Dysfunction	Group I	Group II	P value
Normal	21	15	0.01
Low T3 syndrome	5	6	
Subclinical Hypothyroidism	3	5	
Overt Hypothyroidism	2	4	

Table II, graph I show that thyroid function in group I and group II was normal in 21 and 15, low T3 syndrome in 5 and 6, subclinical hypothyroidism in 3 and 5, and overt hypothyroidism in 2 and 4 respectively. The difference was significant (P< 0.05).

Graph I Assessment of thyroid dysfunction in both groups

Table III Correlations between thyroid function and in T2DM patients without and with DN

TSH	Group I		Group II	
	r	p	r	p

SCr	-0.131	0.12	0.034	0.01
eGFR	-0.025	0.43	-0.031	0.02
UACR	-0.014	0.82	0.039	0.04

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

DISCUSSION

Thyroid hormones are important for the body's metabolism and energy balance. They also help insulin work and keep glucose levels in check. 6 Studies have shown that people with diabetes are more likely to have thyroid problems than people who don't have diabetes. People with type 2 diabetes mellitus (T2DM) often have obvious hypothyroidism. 7 Moreover, subclinical hypothyroidism (SCH), a pathological status defined as an elevated serum thyroid stimulating hormone (TSH) value with normal concentrations of free thyroid hormones, has received increasing concern in recent years. 8 The purpose of this study was to find out how well the thyroid works in people with type 2 diabetes mellitus with or without nephropathy.

We found that group I had 16 males and 14 females, and group II had 15 males and 15 females. Sharma et al. 100 patients with type 2 DM were divided into two groups of 50 patients each. Group 1 consisted of patients with type 2 DM without nephropathy, and group 2 consisted of patients with type 2 DM with nephropathy. Out of 100 patients, thyroid dysfunction was more prevalent in the diabetic nephropathy group as compared to the diabetic without nephropathy group. The P-value for thyroid dysfunction in diabetic nephropathy was statistically significant. In our study, we found a statistically significant correlation between TSH and serum insulin levels in patients with diabetes and diabetic nephropathy. A higher prevalence of thyroid dysfunction like low T3 syndrome and subclinical hypothyroidism was found in women as compared to men.

We found that thyroid function in group I and group II was normal in 21 and 15, low T3 syndrome in 5 and 6, subclinical hypothyroidism in 3 and 5, and overt hypothyroidism in 2 and 4, respectively. Zhao et al. (10) 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 ($r = 0.560$, $p < 0.001$).

We found that there was a correlation of TSH with SCr, eGFR, and UACR in group II ($P < 0.05$). Another study done by Rajeswari et al. found that TSH levels were positively correlated with insulin in patients with subclinical hypothyroidism (SCH). Singh et al. (2012) found that TSH levels were positively correlated with serum insulin levels.

The study's limitation is the small sample size.

CONCLUSION

The authors found that thyroid dysfunction was more prevalent in patients with diabetic nephropathy.

REFERENCES

1. Tiwari AK, Roa JM. Diabetes mellitus and multiple therapeutic approaches of phytochemicals. Present status and future prospectus. *Current Science*, 83(1), pp. 30-38, 2002.
2. Navarro Gonzalez JF, Mora Fernandez C, De Fuentes MM, Garcia Perez J. Inflammatory molecules and pathways in the pathogenesis of diabetic nephropathy. *Nature Reviews Nephrology*. 2011; 7: 327–40.
3. Canaris GJ, Manowitz NR, Mayor G. The Colorado thyroid disease prevalence study. *Arch intern Med*. 2000; 160; 526- 534.
4. Kar P, Hirani A, Allen MJ. Acute renal failure in a hypothyroid patient with rhabdomyolysis. *Clinical Nephrology*. 2003; 60: 428–9.
5. Kaptein EM. Thyroid hormone metabolism and thyroid diseases in chronic renal failure. *Endocrine Reviews*. 1996; 17: 45–63.
6. Han C., He X., Xia X., et al. Subclinical Hypothyroidism and Type 2 Diabetes: A Systematic Review and Meta-Analysis. *PLoS One*. 2015;10(8)e0135233.
7. Distiller L. A., Polakow E. S., Joffe B. I. Type 2 diabetes mellitus and hypothyroidism: The possible influence of metformin therapy. *Diabetic Medicine*. 2014;31(2):172–175.
8. Han C., Rice M., Cai D. Neuroinflammatory and autonomic mechanisms in diabetes and hypertension. *American Journal of Physiology-Endocrinology and Metabolism*. 2016;311(1): E32–E41.
9. Sharma RK, Sharma AK, Puri S, Singh B, Sharma R, Neki NS, Algona S, Chavan V, Puri N, Garg S. A Comparative Study of Thyroid Function in Patients of Type 2 Diabetes Mellitus without Nephropathy and Type 2 Diabetes Mellitus With Nephropathy. *Ann. Int. Med. Den. Res*. 2017; 3(2): ME11-ME15.
10. Zhao W, Li X, Liu X, Lu L, Gao Z. Thyroid function in patients with type 2 diabetes mellitus and diabetic nephropathy: a single center study. *Journal of Thyroid Research*. 2018 Dec 2;2018.
11. Rajeshwari G, Gopal PS, Srinivas PS, Suresh E. Study of insulin level in hypothyroidism patients. *Int J Med Sci*. 2015; 3: 2000-3.
12. Singh BM, Goswami B, Mallika V. Association between insulin resistance and hypothyroidism in females attending a tertiary care hospital. *Indian journal of clinical biochemistry*. 2010; 25: 141-5.