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Original Research

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

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ABSTRACT:

Background: Diabetes mellitus (DM) is a prevalent metabolic disorder marked byhyperglycemia and metabolic abnormalities of carbohydrates, proteins, and lipids. The present study was conducted to assess thyroid function in type 2 diabetes mellitus patients without nephropathy and with nephropathy. **Materials & Methods:** 60 type II diabetes mellitus patients of both genderswere divided into 2 groups of 30 each. Group I were type II DM patients without diabetic nephropathy and group II were type II DM patients with diabetic nephropathy. Assessment of thyroid level was performed. **Results:** Group I had 16 males and 14 females and group II had 15 males and 15 females. Thyroid level was normal in 23 in group I and 14 in group II, low T3 syndrome in 4 in group I and 8 in group II, subclinical hypothyroidism in 2 in group I and 5 in group II and overt hypothyroidism in 1 in group I and 3 in group II. The difference was significant (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 monitoring in type 2 diabetics and diabetic nephropathy is necessary.

Key words: Diabetes Mellitus, Thyroid function, Nephropathy

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INTRODUCTION

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.¹ In 2000, there was an estimated 2.8% global prevalence of DM, and by 2030, that incidence was expected to reach 4.4%.²

Insulin and thyroid hormones are both engaged in cellular metabolism, and thyroid hormones are insulin antagonists. Functional derangement of the other can occur when one is excessive or lacking.³ An independent risk factor for the development of diabetic nephropathy is subclinical hypothyroidism.² Serum lipid characteristics in type 2 diabetic individuals are significantly impacted by serum TSH and tissue insulin sensitivity.⁴ When insulin sensitivity is inadequate, even relatively small changes in TSH levels can cause significant changes in lipid risk variables, raising the risk of cardiovascular disease.

Because type 2 diabetes often goes undiagnosed for several years before it is discovered, a higher percentage of people with type 2 diabetes are later found to have diabetic nephropathy.⁵

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.⁶However, 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.⁷The 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 60 type II diabetes mellitus patients of both genders. All patients gave their written consent for participation in the study. Data such as name, age, gender etc. were recorded. Patients were divided into 2 groups of 30 each. Group I were type II DM patients without diabetic nephropathy and group II were type II DM patients with diabetic nephropathy. In all patients, 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. 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	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

Thyroid Dysfunction	Group I	Group II	P value
Normal	23	14	0.01
Low T3 syndrome	4	8	
Subclinical Hypothyroidism	2	5	
Overt Hypothyroidism	1	3	

Table II, graph I shows that thyroid level was normal in 23 in group I and 14 in group II, low T3 syndrome in 4 in group I and 8 in group II, subclinical hypothyroidism in 2 in group I and 5 in group II and overt hypothyroidism in 1 in group I and 3 in group II. The difference was significant (P < 0.05).

Graph I Assessment of thyroid dysfunction



Table III Correlations between thyroid function and nephropathy

TSH	Group I		Group II		
	r	р	r	р	
SCr	-0.124	0.35	0.042	0.04	
eGFR	-0.018	0.56	-0.056	0.02	
UACR	-0.027	0.97	0.065	0.05	

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

DISCUSSION

Insulin and thyroid hormones are both engaged in cellular metabolism, and thyroid hormones are insulin antagonists.⁸ Functional impairment of the other can

ensue from excess or deficiency of one. An independent risk factor for the development of diabetic nephropathy is subclinical hypothyroidism.⁹ Serum lipid characteristics in type 2 diabetic

individuals are significantly impacted by serum TSH and tissue insulin sensitivity. Low insulin sensitivity is characterized by relatively subtle variations in TSH levels that are markedly correlated with changes in lipid risk variables and, consequently, cardiovascular risk.¹⁰ Undiagnosed thyroid dysfunction may worsen pre-existing cardiovascular risk as well as compromise diabetic patients' ability to control their metabolism. Diabetic individuals with thyroid dysfunction should be diagnosed and treated as soon as possible to help with glycemic management, reduce cardiovascular risk, and enhance overall health.¹¹The present study was conducted to assess thyroid function in type 2 diabetes mellitus patients without nephropathy and with nephropathy.

We found that group I had 16 males and 14 females and group II had 15 males and 15 females. A study by Saha¹² consisted of 120 subjects which were divided into two groups: patient with diabetes 60 subjects (male-30, female-30) and patient without diabetes 60 subjects (male-30, female-30). Plasma glucose, HbA1c and serum lipids were measured by enzymatic method. Thyroid hormones were measured by a chemiluminescent Micro particle Immunoassay (CMIA). The level of serum TSH in patient with diabetes (3.43 ± 2.71) was significantly (p < 0.05)increased compared to patient without diabetes subjects (1.98 \pm 1.72). TSH levels were positively glucose correlated with fasting plasma (r = 0.240, p < 0.05), serum cholesterol (r = 0.290, p < 0.05),p < 0.020) and triglyceride concentration (r = 0.246, p < 0.05). On the other hand, free T₄ levels were inversely correlated with postprandial blood glucose (r = -0.256, p < 0.046).

We found that thyroid level was normal in 23 in group I and 14 in group II, low T3 syndrome in 4 in group I and 8 in group II, subclinical hypothyroidism in 2 in group I and 5 in group II and overt hypothyroidism in 1 in group I and 3 in group II. Thyroid hormones, serum creatinine, glycated hemoglobin, and urine microalbumin levels were compared between type 2 diabetics without problems, type 2 diabetics with nephropathy, and age- and sex-matched healthy controls in Rai et al's study.¹³ The mean blood T3 level was 91.27 14.56 ng/dl in type 2 diabetes without problems, 88.5320 30.87 ng/dl in type 2 diabetics with nephropathy, and 134.98 28.55 ng/dl in controls. The mean serum T4 level was 7.73 1.42 g/dl in type 2 diabetes without problems, 7.25 2.72 g/dl in type 2 diabetics with nephropathy, and 8.61 1.73 g/dl in controls. Type 2 diabetics without nephropathy had a mean serum TSH level of 3.99 1.87 IU/ ml, while those with nephropathy had a mean level of 4.27 \pm 1.62 μ IU/ml and in controls was 2.07 \pm 1.09 µIU/ml.A study by Singh G et al.¹⁴, showed that patients with type 2 diabetes had abnormal thyroid hormone levels. 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.

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 monitoring in type 2 diabetics and diabetic nephropathy is necessary.

REFERENCES

- Kar P, Hirani A, Allen MJ. Acute renal failure in a hypothyroid patient with rhabdomyolysis. Clinical Nephrology. 2003; 60: 428–9.
- 2. Kaptein EM. Thyroid hormone metabolism and thyroid diseases in chronic renal failure. Endocrine Reviews. 1996; 17: 45–63.
- 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.
- 4. 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.
- Tiwari AK, Roa JM. Diabetes mellitus and multiple therapeutic approaches of phytochemicals. Present status and future prospectus. Current Science. 2002; 83(1): 30–38.
- 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.
- Cannaris GJ, Manowitz NR, Mayor G. The Colorado thyroid disease prevalence study. Arch intern Med. 2000; 160; 526- 534.
- Udiong CEJ, Udoh AE and Etukudoh ME. Evaluation of Thyroid Function in Diabetes Mellitus in Calabar, Nigeria. Indian Journal of Clinical Biochemistry. 2007; 22(2): 74-78
- 9. Rajeshwari G, Gopal PS, Srinivas PS, Suresh E. Study of insulin level in hypothyroidism patients. Int J Med Sci. 2015; 3: 2000-3.
- Islam S, Yesmine S, Khan AS, Alam NH. A comparative study of thyroid hormone levels in diabetic and nondiabetic patients. South East Asian J Trop Med Public Health. 2008; 39 (5): 913-16.
- 11. Jusufovics S, Hodzic E. Functional thyroid disorders are more common in patients on chronic haemodialysis compared with general population. Mat. Soc.Med. 2011;2394:206–09.
- Saha HR, Sarkar BC, Khan SA, Sana NK, Choudhury S. A comparative study of thyroid hormone and lipid status in diabetic and non- diabetic adults. Open access Scientific reports. 2012; 1(9); 2-5.
- Rai S, Kumar JA, Prajna K, Shetty SK, Rai T, Begum M. Thyroid function in type 2 diabetes mellitus and in diabetic nephropathy. Journal of Clinical & Diagnostic Research. 2013 Aug 1;7(8).
- 14. 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.