ASSOCIATION OF HYPOTHYROIDISM IN TYPE 2 DIABETES MELLITUS AND DIABETIC KIDNEY DISEASE

Physiology

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ABSTRACT

Diabetes mellitus (DM) has emerged as a major public health problem in India. Diabetic nephropathy have higher prevalence of thyroid disorder when compared with diabetes mellitus. The present study compared the levels of thyroid hormones between type 2 diabetes mellitus with and without diabetic nephropathy. Among 192 diabetes mellitus patients those who have nephropathy, euthyroid was 124(64.6%), low T3 was 14(7.3%), subclinical hypothyroidism was 36(18.8%) and overt hypothyroidism was 18(9.4%) and other 192 patients those who haven't nephropathy, euthyroid was 159(82.8%), low T3 was 7(3.6%), subclinical hypothyroidism was 11(5.7%) and overt hypothyroidism was 15(7.8%). We found a statistically significant correlation between TSH and urine protein creatinine ratio (urine PCR). Routine assessment of thyroid hormones in patients will help to improve general wellbeing and reduce the mortality risk.

KEYWORDS

Thyroid function, Type 2 Diabetes mellitus, Diabetic nephropathy.

INTRODUCTION

Diabetes mellitus has emerged as a major public health problem in India. Diabetes mellitus can gradually cause damage to small and large blood vessels. In diabetic nephropathy, the small blood vessels of the kidney get damaged over a period of time. This impairs adequate filtration and excretion of waste products and excess fluids from the blood. Thyroid hormones are insulin antagonists, both insulin and thyroid hormones are involved in cellular metabolism. Excess or deficit of any one can result functional derangement of the other.¹ Thyroid hormones affect renal development and physiological functions of the kidney. Thyroid disorders can cause remarkable changes in renal plasma flow, glomerular filtration rate, renal structure, renal tubular absorption and secretion.² The aim of the present study was to compare and correlate the thyroid hormone levels, urine protein creatinine ratio between type 2 diabetes with and without diabetic nephropathy.

MATERIALS AND METHODS

This is a case control study conducted at Little Flower Hospital and Research Centre, Angamaly, Kerala. The study was approved by the Institutional Ethics Committee.

This study was conducted on 384 patients in the age group of 30-80 years. These patients were grouped into 2 with 192 patients each. Group 1 consisted of type 2 diabetes mellitus with diabetic nephropathy and group 2 consisted of type 2 diabetes mellitus without diabetic nephropathy.

After obtaining informed consent, the patients were subjected to detailed history including demographic characteristics, life style habits (smoking & drinking), medical history, medication and lab investigations includes thyroid function test [Free T3(pg/ml), Free T4(ng/dl), TSH(uIU/ml)], serum creatinine(mg/dl), glycated haemoglobin and urine protein creatinine ratio.

Inclusion Criteria

1. Age 30- 80 years
2. Type 2 diabetes mellitus with diabetic nephropathy(Chronic kidney disease stage 1-4) on conservative management.
3. Type 2 diabetes mellitus without diabetic nephropathy
4. Euthyroid

Exclusion criteria

1. Age less than 30 years
2. Type 1 diabetes mellitus
3. Non diabetic kidney disease
4. Thyroid disease
5. Glucocorticoids and oral contraceptives

6. Pregnancy
7. Autoimmune disorders
8. Malignant tumor

Statistical Analysis

The data was analysed using SPSS 20.0 version. Chi square test and t test was used for analysis. P<0.001 was considered as significant.

RESULTS

A total of 384 patients were included in my study with two group of patients namely patients of diabetes mellitus with nephropathy and without nephropathy. Serum free T3, free T4, TSH levels were compared between two groups using Chi square and t test. In order to explain the association of thyroid function with diabetic kidney disease, we divided the patients into euthyroid (normal thyroid function), low T3 syndrome (low T3, normal T4 and TSH), subclinical hypothyroidism (high TSH) and overt hypothyroidism (low FT4, high TSH). In our study in group 1 (Type 2 diabetes mellitus with nephropathy) there were 48 (25%) females and 144 (75%) males. In group 2 (Type 2 diabetes mellitus without nephropathy) there were 84 (43.8%) females and 108 (56.3%) males. The study showed that men were prone to suffering from diabetic kidney disease than women. The results in Table 1 shows statistically significant difference in the gender between two groups.

Table 1: Comparison of gender between groups

Gender	Group		p value
	DM with Nephropathy n=192(%)	DM without Nephropathy n=192(%)	
Female	48(25)	84(43.8)	<0.001
Male	144(75.0)	108(56.3)	

Among 192 DM patients those who have nephropathy, euthyroid was 124 (64.6%), low T3 was 14 (7.3%), subclinical hypothyroidism was 36 (18.8%) and overt hypothyroidism was 18 (9.4%) and patients those who haven't nephropathy, euthyroid was 159(82.8%), low T3 was 7(3.6%), subclinical hypothyroid was 11 (5.7%) and overt hypothyroidism was 15 (7.8%). The results showed statistically significant difference in the thyroid dysfunction between two groups (p value <0.001). Serum TSH levels were found to be increased in Type 2 diabetics with nephropathy when compared with Type 2 diabetics without nephropathy.

When data was analysed by Pearson correlation, we observed a statistically significant positive correlation between TSH and urine protein creatinine ratio $r=0.552$, p value <0.001).

Table 3. Correlation of TSH and Urine PCR in case

TSH(uIU/ml)	Urine PCR		
	Pearson Correlation coefficient	p value	N
	0.552	<0.001	192

DISCUSSION

The study showed that the low T3 and serum TSH levels were increased in Type 2 diabetes mellitus with nephropathy when compared with Type 2 diabetes mellitus.

A cohort study by Zhang *et.al* (2014) also indicated that low normal FT3 levels were associated with an increased risk of chronic kidney disease in euthyroid population.³ Another study in China based on the relationship between thyroid hormone and Type 2 diabetes mellitus speculated that the prevalence of Diabetic kidney disease depended on the concentrations of FT3 irrespective of the gender.⁴

A study by Chubb *et.al* (2013) had shown that the prevalence of subclinical hypothyroidism among Type 2 diabetes is 8.6%.⁵ Similar study done by Mansournia *et.al* in year 2016 showed incidence of subclinical hypothyroidism in diabetic nephropathy was 29% as compared to 17% in without diabetic nephropathy group.⁶ Our results were in agreement with the above study, there were 18.8% patients in diabetic nephropathy group had subclinical hypothyroidism and 5.7% in Type 2 diabetes without nephropathy group.

Another study by Srinidhi *et.al* (2013) on thyroid function in Type 2 diabetes mellitus and in diabetic nephropathy, they concluded that failure to recognize the presence of abnormal thyroid hormone levels may be a main cause of poor management of Type 2 diabetes mellitus.⁷

CONCLUSION

Subclinical hypothyroidism is an independent risk factor for development of diabetic nephropathy.⁸ Regulating thyroid hormones might have a renoprotective effect. Recognition and treatment of thyroid dysfunction in diabetic patients will benefit glycemic control, improve the quality of life and reduce cardiovascular risk.

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