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A study on significance of thyroid dysfunction in type ii diabetes mellitus patients with respect to age and duration of diabetes in-Hapur district

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Abstract
Introduction: Diabetes Mellitus and Thyroid Disease are common endocrine disorders in the general population. There is a definite relationship between thyroid dysfunction and diabetes, seems to indicate a higher occurrence of thyroid dysfunction among diabetes when compared with general population. there are several implications for patients with diabetes and thyroid dysfunction. The presence of thyroid dysfunction may affect diabetes control. Hyperthyroidism is typically associated with worsening glycemic control and increased insulin requirements.
Aims and Objective: Relation between duration of type II Diabetes with the Thyroid status (FT3, FT4 and TSH) in Diabetes Mellitus patients.
Materials and Methods: The present study was carried out in Saraswathi Institute of Medical Sciences, Anwarpur, Hapur. The study was an open randomized comparative study. The study was conducted from April 2019 to October 2019 and Ethical clearance from Institutional Ethical Committee was obtained. A total of 150 patients are categorized into two groups, GROUP I: 50 non diabetic patients as controls. GROUP II: 100 patients with diabetes mellitus.
Result: Our study shows that in a sample of 100 diabetic cases, the prevalence of thyroid dysfunction was 34% (34 out of 100 cases). Out of 34% cases – 18% were subclinical hypothyroidism, 12% hypothyroidism and 4% hyperthyroidism cases.
Conclusion: Detection of abnormal thyroid hormone levels in addition to other biochemical variables in the early stage of diabetes will help patients improve their health and reduce their morbidity rate.

Keywords: Thyroid dysfunction, diabetes mellitus Patients duration of diabetes

Introduction

Diabetes Mellitus and Thyroid Disease are common endocrine disorders in the general population. There is a definite relationship between thyroid dysfunction and diabetes, seems to indicate a higher occurrence of thyroid dysfunction among diabetes when compared with general population.

The Thyroid is a butterfly shaped gland located in the front of the neck, just above the trachea. It weighs approximately 15 to 20 grams in the adult human. The thyroid produces and releases into the circulation at least two potent hormones, thyroxine (T4) and triiodothyronine (T3), which influence basal metabolic processes and/or enhance oxygen consumption in nearly all body tissues. Thyroid hormones also influence linear growth, brain function including intelligence and memory, neural development, dentition, and bone development. In various studies it was found that, patients with type II diabetes have multiple alteration of thyroid hormone metabolism in the absence of concurrent thyroid disease. These may include elevated basal TSH values, which may transiently increase to greater than 4.2 µIU/ml, blunted TSH response to Thyrotropin Releasing Hormone (TRH), diminished or absent TSH diurnal rhythm, altered TSH glycosylation, and impaired TSH and TRH clearance rates. A number of reports have also indicated a higher than normal prevalence of thyroid disorders in type II diabetes patients, with hypothyroidism being the most common disorder [1]. The major alterations in thyroid hormone system are reduction in the TSH stimulation of the thyroid gland, probably caused by central hypothyroidism, and in the peripheral generation of T3 and T4. The presence of thyroid dysfunction may affect diabetes control. Hyperthyroidism is typically associated with worsening glycemic control and increased insulin requirements. There is underlying increased hepatic gluconeogenesis, rapid gastrointestinal glucose absorption, and probably increased insulin resistance. Indeed, thyrotoxicosis may unmask latent diabetes. Thyroid disease is one of the leading causes of inadequate glycemic control in both of the major diabetes leading to death of the patient. The spectrum of thyroid dysfunction in type II diabetes ranges from subclinical hypothyroidism, hypothyroidism to hyperthyroidism.

Methodology

Study area: The study was conducted in Department of Community Medicine & Pathology S.I.M.S. Hapur.,

Study design: The study was an open randomized comparative study

Study Period: The study was conducted from March 2019 to November 2019.

Study population: GROUP I: 50 non diabetic patients as controls

Group II: 100 patients with diabetes mellitus

Statistical analysis: Data were expressed as mean ± standard deviation of the number of experiments, SPSS and Microsoft Excel programmers were used. The statistical signicance was calculated by student's test using SPSS version. A two tailed p value of < 0.05 was considered and indicative of statistically significant difference.

Table 1: Sex wise distribution of cases and controls in the study groups

Cases n = 100				Controls n = 50			
Male		Female		Male		Female	
No.	%	No.	%	No.	%	No.	%
48	48.0	52	52.0	25	50.0	25	50

n = number of patients

All the cases were type II diabetes (diabetes mellitus). Controls were taken as age and sex matched with the cases in this study.

Table 2: Age and sex wise distribution of the cases

Age group (Yrs)	Male	Female	Total	
			No.	%
36-45	4	8	12	12
46-55	24	26	50	50
56-65	16	16	32	32
66-75	4	2	6	6
Total	48	52	100	100

n = number of patients

Most of the cases were taken from 46 to 65 years age group. There were 50% of cases in 46-55 years age group and 32% in 56-65 years age group in this study group.

Table 3: TSH levels of the cases in the study group

TSH Value	Interpretation	Sex distribution		Total
		Male	Female	n = 100
<0.27 µIU/ml	Hyperthyroidim	2	2	4 (4%)
0.27-4.2 µIU/ml	Euthyroidism	36	30	66(66%)
4.2-10 µIU/ml	Subclinicalc hypothyroidism	6	12	18(18%)
>10 µIU/ml	Hypothyroidism	4	8	12(12%)
Total		48	52	100

n = number of cases

There were 66% euthyroid cases (18%) were in category of subclinical hypothyroidism. Rest cases were hyperthyroidism (4%) or hypothyroidism (12%).

Table 4: Comparison between TSH values and duration of diabetes in different age groups

Age (years)	Number of patients	TSH value (mean ± 2 SD) (µIU/ml)	Mean age of duration of diabetes in cases (yrs)
36 – 45	12	3.26 ± 1.30	5.3
46 – 55	50	3.75 ± 2.80	7.64
56 – 65	32	5.88 ± 4.99	8.25
66 – 75	6	3.86 ± 4.60	11.7

TSH is positively correlated with mean duration of diabetes as shown in this table. TSH values gradually increases in 35-65 years age group.

Table 5: Association of TSH values with clinical score for hypothyroidism in patients of type ii diabetes

TSH value (µIU/ml)	Clinical score for hypothyroidism			Total
	<3	3 – 5	>5	
<0.27	4 (100%)	0 (0%)	0 (0%)	4
0.27 – 4.2	50(75.76%)	14 (21.2%)	2 (3.03%)	66
4.2 – 10	10 55.56%)	6 (33.33%)	2 (11.11%)	18
>10	6 (50.0%)	4 (33.33%)	2 (16.67%)	12
Total	70	24	6	100

P – Value = >0.05

It is clear from the table, most of the patients come in <3 scoring with varied TSH value. On applying chi square test, to test the significance for comparing <3 and <3 of this observation, chi square value = 3.36 and the p value = <0.05. Thus the apparent signs of hypothyroidism with TSH value had no significance.

Table 6: Distribution of thyroid dysfunction in patients of type ii diabetes

Cases	Total		z – value	P - value
	n	%		
Controlled diabetes mellitus (n = 52)	12	23.1%	2.10	<0.05
Uncontrolled diabetes mellitus (n = 48)	22	45.8%		
Total	34	34%		

n = number of cases

The above table clearly shows that thyroid dysfunction is more common in patients with uncontrolled diabetes mellitus (45.8%) as compared to that with controlled diabetes mellitus (23.1%) the difference between the two groups is statistically significant (z score – 2.10, p value <0.05).

Discussion

In our study we reported a higher prevalence of thyroid dysfunction among diabetic females, in which hypothyroidism was more common. Out of 34% cases – 18% were subclinical hypothyroidism, 12% hypothyroidism and 4% hyperthyroidism cases. In 18 patients of subclinical hypothyroidism – 12 cases were of females and 6 cases of males. In 12 cases of hypothyroidism, 8 cases were of females and 4 cases of males. In the study of Perros *et al.*, hypothyroidism was 10.9% in females and 6.9% in males. C. E. J. Udiong *et al*. studied hypothyroid states was higher in females (16.8%) than in males (9.9%). In Jordan study, most common was subclinical hypothyroidism (4.1%). In Arthur study (1999) there were 5% hypothyroidism females and 0.2% males. In the present study, cases (i.e. patients of type II diabetes) were approximately equally distributed in males (48%) and females (52%). Maximum number (50%) of cases was in 46 – 55 years of age group.

Thyroid dysfunction patients were widely distributed in all age groups, but most of the patients were above 45 years of age, and 46 – 55 age groups had maximum number of patients (47%). Mean age of patients with thyroid dysfunction was 54.76 ± 6.05 years whereas the mean age of all the cases was 53.35 ±7.40 years. Our observations are in conformity to those of C. E. J. Udiong *et al*. (2007) who reported maximum number of cases in 46 – 55 years of age group in the control group, 3 (6.0%) patients had abnormal thyroid functions. The most common form was subclinical hypothyroidism (4.0%). There was only one (2.0%) patient with hypothyroidism, while no hyperthyroid patient was detected in the control group. As in the previous study conducted in Jordan (2004) by Radaideh. E. *et al*., in the control group the prevalence of thyroid disease was 6.6% and the most common was subclinical hypothyroidism.

Conclusion

This study showed a high prevalence of thyroid dysfunction in type II diabetic patients particularly in females. Failure to recognize the presence of abnormal thyroid hormone levels in diabetes may be a primary cause of poor management often encountered in some treated diabetics. There is therefore need for the routine assay of thyroid hormones in diabetics. Particularly in those patients whose conditions are difficult to manage. Substantial prevalence of thyroid abnormalities was noted in patients with diabetics. Women with type II diabetes are at a high risk for symptomatic thyroid dysfunction and therefore may benefit from routine thyroid function screening. A sensitive serum TSH assay is the screening test of choice. The baseline TSH level may be a better predictor of thyroid dysfunction than thyroid autoantibodies in people with diabetes. It will give low cost of investigation for the diagnosis of thyroid dysfunction, especially in our Indian subcontinent where the poverty is a big problem. Control of diabetes can be more easily done if thyroid status is routinely done among these patients and especially those who are having uncontrolled diabetes. Our study aim was that if these findings were at the beginning of diabetes and with time they would have been more problematic so it is necessitates further care and attention to this problem. There is interdependence between insulin and thyroid hormones for normal cellular metabolism so that diabetes mellitus and thyroid disease can mutually influence each other illness process. In our study we showed that in a sample of 100 diabetic cases, the prevalence of thyroid dysfunction was 34% (34 out of 100 cases). Out of 34% cases – 18% were subclinical hypothyroidism, 12% hypothyroidism and 4% hyperthyroidism cases. In 18 patients of subclinical hypothyroidism – 12 cases were of females and 6 cases of males. In 12 cases of hypothyroidism, 8 cases were of females and 4 cases of males.

The potential benefits of early detection and treatment of subclinical thyroid dysfunction significantly outweigh the potential side – effects that could result from early diagnosis and therapy. I also strongly recommend and aggressive approach to case – finding in patients presenting with symptoms and/or signs that suggest the possibility of thyroid dysfunction in type II diabetes. It will be necessary for clinicians and patients to consider each individual's unique situation in determining the need for testing and treatment. In conclusion our findings demonstrate that detection of abnormal thyroid hormone levels in addition to other biochemical variables in the early stage of diabetes will help patients improve their health and reduce their morbidity rate.

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