

A STUDY ON PREVALANCE OF HYPOTHYROIDISM IN DIABETICS

Dr Asrar Ahmed^{1*}

1. Assistant Professor ,Dept of Gen. Medicine, National Institute of Medical Sciences(NIMS),Jaipur

* Email ID of Corresponding Author: asrarahmed15@yahoo.com

Received: 22/02/2014

Revised: 18/06/2014

Accepted: 29/06/2014

ABSTRACT

Objectives: Thyroid diseases and diabetes are two common endocrinopathies. The coexistence of diabetes mellitus with hypothyroidism is a known clinical observation. The association of these two diseases may lead to dyslipidaemia causing increased morbidity and mortality. Hence screening for hypothyroidism in diabetics may help in early detection and treatment to reduce this increased risk of morbidity and mortality. **Material and methods:** This study was designed to know the prevalence of hypothyroidism in diabetics at our institution. 100 known cases of diabetes attending outdoor of NIMS Medical College Jaipur, were screened for thyroid dysfunction by doing thyroid profile. **Results:** It was found that hypothyroidism was present in 13% patients of diabetes, which is a significant association. **Conclusion:** On the basis of observations of this study, it is recommended to routinely screen patients of diabetes for presence of hypothyroidism to prevent long term morbidity and mortality.

Keywords: diabetes, hypothyroidism.

INTRODUCTION

Thyroid hormones play an important role in metabolic processes in humans and decreased level of these hormones results in a clinical syndrome known as hypothyroidism. Hypothyroidism consecutively causes overall slowing down of metabolism of body.

Subclinical hypothyroidism refers to biochemical evidence of thyroid hormone deficiency in patients who have few or no apparent clinical features of hypothyroidism.

Diabetes mellitus and thyroid diseases are the two common endocrinial diseases. On one hand, thyroid hormones have some role in the regulation of pancreatic function and carbohydrate metabolism, and on the other hand, diabetes affects thyroid function tests to some variable extents. Both insulin and thyroid hormones being

closely engaged in cellular metabolism, abnormal serum levels of either of these hormones affect the functioning of other hormone. The association between Diabetes Mellitus and thyroid disorders was widely established in first study published in 1979.(1) In patients with diabetes mellitus, glycaemic status strongly influences the releasing mechanism of thyroid hormones. Poorly controlled diabetics have a “Low T3 state” characterized by low serum total and free T3 levels, because of impaired TSR response to TRH or loss of normal nocturnal TSH peak.(2,3) Good glycaemic control may normalize TSR responses and “low T3 state”.

Since patients with one organ-specific autoimmune disease have more risk to develop other autoimmune disorders, hence it is found

that diabetics have a higher prevalence of thyroid disorders as compared with the normal population. The rate of postpartum thyroiditis in diabetic patients is three times of that in normal women. (4,5) The most common form of thyroid dysfunction in type 2 diabetes is subclinical hypothyroidism.(6) Thyroid disorders are found commonly in most forms of diabetes and are associated with advanced age particularly in type 2 diabetes. This study tries to assess the prevalence of thyroid disease in diabetics and justify the view that all diabetic patients should be screened for hypothyroidism.

MATERIALS AND METHODS

The study was conducted at the Department of Medicine, NIMS Medical College and Hospital, over the period of one & half year from February, 2013 to July 2014. A screened population of 100 patients of type 2 diabetes mellitus as diagnosed by ADA criteria were studied. Their clinical and thyroid hormone profiles were studied after necessary consent. T₃, T₄, TSH were measured from serum of subjects by chemi illuminometric assay (CLIA). The normal values of thyroid hormones used in this study are: TSH - 0.34-4.25 mIU/L, T₄ - 5.4-11.7 µg/dl, T₃ - 77- 135 ng/dl.

RESULTS

Of the 100 type 2 diabetics studied, a total of 13 (13%) were found to have thyroid dysfunction. All of the 13 with thyroid dysfunction were hypothyroid. Of the 13 hypothyroid subjects, 3 (3%) were male and 10 (10%) were females.

Table 1 Spectrum of Hypothyroidism

Age Group	No. of Patients	No. of Males	No. of Females
Clinical Hypothyroidism	4 (4%)	1 (1%)	3 (3%)
Subclinical Hypothyroidism	9 (9%)	2 (2%)	7 (7)

Of the 13 hypothyroid subjects, 4 (4%) had clinical hypothyroidism wherein TSH was

elevated and T₃, T₄ were decreased. The clinical features of hypothyroidism seen in these patients were subtle. 3 of the 4 patients had generalized weakness and lethargy, 2 of them had dry coarse skin. 9 of the 13 hypothyroid subjects were having subclinical hypothyroidism with raised TSH levels but normal T₃, T₄ with no clinical features of hypothyroidism as shown in graph and table no. 1.

Table 2 Relation between duration of DM and Thyroid dysfunction

Duration	Total no. of subjects	No. of subjects hypothyroid
0-5 yrs	28	2 (7.14%)
6-10 yrs	35	4 (11.76%)
11-15 yrs	21	4 (19.4%)
> 15 yrs	16	3 (18.75%)

Table 3 Relation between Glycaemic Control and Thyroid Dysfunction

	Diabetics with hypothyroidism	Diabetics without hypothyroidism
Good glycaemic control	6 (46.2%)	40 (45.9%)
Poor glycaemic control	7 (53.8%)	47 (54.1%)

In relation to glycaemic control, it was observed that of the 13 subjects with hypothyroidism, 6 (46.2%) had good glycaemic control whereas 7(53.8%) had poor glycaemic control.

11(84.6%) of the hypothyroids had LDL cholesterol levels >130mg/dl and 2 (15.4%) had LDL-CH levels <130mg/dl. In the subjects without hypothyroidism 58 (66.6%) had LDL-CH >130mg/dl whereas 21(33.3%) had levels <130mg/dl.(Table 4)

Table 4 Relation between Thyroid Dysfunction and High LDL-CH Levels

	Diabetics with hypothyroidism	Diabetics without hypothyroidism
LDL-CH >130 mg/dl	11 (84.6%)	58 (66.6%)
LDL-CH <130 mg/dl	2 (15.4%)	21 (33.3%)

DISCUSSION

This study included 100 Type 2 diabetics attending the medicine outpatient department. In the previous studies the number of patients included ranged from 77 in a study by Nobre EL et al, (6) 100 in study by Rajan SK et al. (7)

The present study showed that of the 100 type 2 diabetics studied, a total of 13% had thyroid dysfunction. All of the 13 with thyroid dysfunction were hypothyroid. The above results are in agreement with previous studies showing an association between T2D and thyroid dysfunction. A study by Smithson et al, showed a prevalence of 10.8% of thyroid dysfunction in diabetic patients registered in general practice.(8) Another study by Perros et al, in a randomly selected diabetic adults calculated that the prevalence of thyroid dysfunction was found 13.4%. (9)

A recent study by Akbar DH et al, reported that thyroid dysfunction was present in 16% of Saudi T2D patients.(10) Also, a study by Radadeih et al showed that the overall prevalence of thyroid dysfunction was 12.5% in T2D patients. (11) Another recent study done in Greek diabetic patients by A. Papazafiropoulou et al estimated the prevalence of thyroid dysfunction to be 12.3%. (12).

The NHANES-III study (13) reported that the prevalence of subclinical hypothyroidism was 3.4% in males and 5.8% in females. Another

study conducted in Nigeria (14) had shown a high incidence (46.5%) - hypothyroidism being 26.6%. The prevalence of hypothyroidism in this study was higher in females (16.8%) than in males (9.9%).

The prevalence of clinical hypothyroidism in this study was 4% whereas prevalence of subclinical hypothyroidism was 9%. This is comparable to the previous studies. In a study by Nobre et al(6) subclinical hypothyroidism was 7.2% whereas hypothyroidism was 3.5%. In another study by Rajan SK et al (7), the prevalence of clinical hypothyroidism was only 1% whereas subclinical hypothyroidism accounted for 11%. In one more study conducted by Palma et al(15) with 386 patients, the prevalence of thyroid disorders in all diabetic patients was 14.7% and the most frequent thyroid disorder was subclinical hypothyroidism in 12%. Another study (16) conducted in India also showed that elderly females had high incidence of sub clinical hypothyroidism (18.2%).

In addition, a study in 420 adult females with T2D participants in the community-based Fremantle Diabetes showed that the prevalence of subclinical hypothyroidism was 8.6%. (17) This high prevalence of subclinical hypothyroidism calls for screening of all type 2 diabetics for thyroid dysfunction.

Of the different age groups included in the study, highest numbers of cases of hypothyroidism i.e., 7 (7%) were observed in the age group 56-65 yrs. Of these, 2 were males and 5 were females and 3 had clinical hypothyroidism whereas 4 had subclinical hypothyroidism. In the 45-55 yrs age group, 3 female subjects had subclinical hypothyroidism. In the age group of 66-75 years, 3 subjects were observed to have hypothyroidism of which 1 female had clinical hypothyroidism and 1 male and 1 female had subclinical hypothyroidism. No subjects beyond 75 yrs of age were found to have hypothyroidism. This difference in the prevalence of thyroid dysfunction in different age groups may be due to the varying number of subjects included in

each age group. In a retrospective study conducted in Imphal by Salam Ranabir (18) with 202 type 2 DM patients constituting of 61 males and 141 females, 139 (68.8%) were euthyroid, 33 (16.3) had subclinical hypothyroidism, 23 (11.4%) had hypothyroidism (6 males and 17 females), 4 (2%) have subclinical hyperthyroidism and 3 (1.5%) had hyperthyroidism.

It was observed that with increasing duration of diabetes, the percentage of diabetics with hypothyroidism were more.

In this study it was noted that there was no significant difference in glycemic control, chronic complications of diabetes like diabetic retinopathy and neuropathy in diabetics with hypothyroidism and without hypothyroidism. Similarly, Nobre et al (6), in a study did not find any relationship between metabolic control and thyroid function.

Of the 13 subjects of hypothyroidism, it was found that 11(84.6%) had LDL- cholesterol levels >130mg/dl and 2 (15.4%) had LDL-CH levels <130mg/dl. In the subjects without hypothyroidism 58 (66.6%) had LDL-CH >130mg/dl whereas 21(33.3%) had levels <130mg/dl. A greater percentage of diabetics with hypothyroidism had high serum LDL-CH levels when compared to those without hypothyroidism despite being on hypolipoproteinemic drugs. Dyslipidemia (21) is a reported complication of hypothyroidism in nondiabetic and diabetic subjects as seen in various studies done by Elder J et al (19) and Gray RS et al (22). In another study conducted by Gray et al (22) Forty-nine diabetics with primary thyroid failure (as indicated by an elevated TSH concentration) without overt clinical evidence of hypothyroidism, had a higher mean plasma cholesterol concentration when compared to 49 euthyroid diabetics.

CONCLUSION:

The prevalence of hypothyroidism is high in individuals with type 2 diabetes mellitus. It is 13% in this study. Hypothyroidism is more common in diabetic females when compared to diabetic males with 10% of the cases being females and 3% being males.

Subclinical hypothyroidism is more common in diabetics, with a prevalence of 9% when compared to clinical hypothyroidism which has a prevalence of 4%. This study justifies the view that all diabetic patients should be screened for hypothyroidism.

The coexistence of hypothyroidism with diabetes mellitus leads to high serum cholesterol levels. The ability to diagnose and treat unsuspected hypothyroidism in diabetics may result in reduced morbidity and mortality.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Feely J, Isles TE. Screening for thyroid dysfunction in diabetics. Br Med J 1979;1(6179):1678.
2. Gursoy NT and Tuncel E. "The relationship between the glycemic control and the hypothalamus-pituitary-thyroid axis in diabetic patients," Turkish Journal of Endocrinology and Metabolism. 1999;4:163-168.
3. Beer SF, Parr JH, Temple RC and Hales CN. "The effect of thyroid disease on proinsulin and C-peptide levels," Clinical Endocrinology. 1989;30(4): 379–383.
4. Geralyn R, Spollert MSN, ANP, CDE; Diabetes Spectrum volume 19, Number 3,2006.

- 5.Haze M, Zantout MS, and Azar ST. Thyroid Disorders and Diabetes Mellitus Journal of Thyroid Research Volume 2011 (2011), Article ID 43946323, 7 pages.
- 6.Nobre EL, Jorge Z, Pratas S, Silva C, Castro JJ. Profile of the thyroid function in population with type 2 diabetes mellitus. Endocrine Abstracts. 3; 298.
- 7.Rajan SK, Ezhilarasi A, Sasidharan M. Thyroid Dysfunction in Patients with Type 2 Diabetes Mellitus. JAPI. 2003 Dec;51:1229
- 8.Smithson MJ. Screening for thyroid dysfunction in a community population of diabetic patients. Diabetic Medicine. 1998;15:148-50.
- 9.Perros P, McCrimrnon RJ, Shaw G, Frier BM. Frequency of thyroid dysfunction in diabetic patients: value of annual screening. Diabetic Medicine. 1995;12:622-7.
10. Akbar DH et al. thyroid dysfunction and thyroid autoimmunity in Saudi type 2 diabetics, Acta Diabetologia Olmay. 2006;43(1):14-8.
- 11.Radaieh AR, Nusier MK, Amari FL, Bateiha AE, El-Khateeb MS, Naser A S. Thyroid dysfunction in patients with type 2 diabetes mellitus in Jordan. Saudi Medical Journal. 2004 Aug;25(8):1046-50.
- 12.Athanasia Papzaifiropoulou, et al. prevalence of thyroid dysfunction among greek diabetics attending outpatient clinic, Jelin med res. 2010;29(2).
- 13.Hollowell JG, Staehling NW, Flanders WD, Hannon WH, Gunter EW, Spencer CA, Braverman LE. Serum TSH, T(4), and thyroid antibodies in the United States population (1988 to 1994): National Health and Nutrition Examination Survey (NHANES III). J Clin Endocrinol Metab. 2002;87(2): 489-499.
14. Udiong CEJ. et al, evaluation of thyroid function in diabetes mellitus in calabar, Nigeria, Indian journal of clinical biochemistry. 2007;22(2):74-78.
15. Palma et al. Diabetology & Metabolic Syndrome 2013, 5:58http://www.dmsjournal.com/content/5/1/58
- 16.Ravishankar SN. A prospective study of thyroid dysfunction in patients with Type 2 Diabetes in general population. Archives of Medicine. 2013;5:1.
- 17.Chubb SA, Davis WA, Inman Z, Davis TM. Prevalence and progression of subclinical hypothyroidism in women with type 2 diabetes: the Fremantle Diabetes Study. Clin Endocrinol (Oxf). 2005;62(4):480-486.
- 18.Demitrost L, Ranabir S. Thyroid dysfunction in type 2 diabetes mellitus: A retrospective study. Indian J Endcr Metab[serial online]2012[cited 2014 Dec 12]:16, Suppl S2:334-5. Available from http://www.ijem.in/text.asp? 2012/16/8/334/104080.
19. Elder J, McLlland A, O'Reilly DS, Packard CI, Series JJ, Shepherd J. The relationship between serum cholesterol and serum thyrotropin, thyroxine and triiodothyronine concentrations in suspected hypothyroidism. Ann Clin Biochem. 1990;27(Pt 2):110-113.
20. Udiong CEJ. et al, evaluation of thyroid function in diabetes mellitus in calabar, Nigeria, Indian journal of clinical biochemistry. 2007;22(2):74-78.
21. Patricia Wu. Thyroid Disease and Diabetes: Practical Pointers. Clinical Diabetes. 2000 winter;18(1):10-12.
- 22.Gray RS, Smith AF, Clarke BF. Hypercholesterolemia in diabetics with clinically unrecognized primary thyroid failure. Horm Metab Res. 1981; 13(9):508-510.