

THYROID FUNCTION ASSESSMENT IN TYPE 2 DIABETES MELLITUS PATIENTS

Dr. Ravindra K Hadakshi¹, Dr Gaurav Modi^{2*}

1. Assistant professor, Department of medicine, Zyodus medical college and hospital, Dahod, Gujarat. 2. Associate Professor, Department of Biochemistry, GMERS Medical college, Vadnagar, Gujarat.

*Corresponding author - Dr Gaurav Modi

Email id - dr_gauravmodi2004@yahoo.co.in

Received:10/01/2018

Revised:12/06/2018

Accepted:28/06/2018

ABSTRACT

Background: Diabetes Mellitus is the most common endocrine metabolic disorder seen among all other metabolic disorders. Thyroid disorders are also prevalent among population; however, the prevalence is not as high as diabetes. Since both disorders are endocrine in nature, there was always a curiosity to find out the association between these two. **Material & Methods:** A total of 100 patients and 100 controls were enrolled for study, which were attending the OPD of general medicine department of GMERS Medical college, Vadnagar, Gujarat. The diagnosed patients with type 2 diabetes were enrolled for study by simple random sampling. **Results:** The magnitude of subclinical hypothyroidism among the control group was 8% and among the type II diabetes group was 19% ($p=0.743$). The magnitude of Clinical Hypothyroidism among the control group was 3% and among the type II diabetes group was 12% ($p=0.461$). The magnitude of subclinical hyperthyroidism among the control group was 1% and among the type II diabetes group was 2% ($p=0.612$). The magnitude of Clinical hyperthyroidism among the type II diabetes group was 1% and it was absent among the control group (0.745) **Conclusion:** The higher prevalence of thyroid dysfunction was observed among type 2 diabetes group in comparison to healthy controls, though the difference was not statistically significant. The most prevalent thyroid dysfunction found in present study was subclinical hypothyroidism among both the study groups

Key words: diabetes mellitus, thyroid dysfunction, hypothyroidism, hyperthyroidism.

INTRODUCTION

Diabetes Mellitus is the most common endocrine metabolic disorder seen among all other metabolic disorders (1). The spectrum of this disease is very wide and includes complications like involving small and large vessels which results into neuropathy, nephropathy, retinopathy, IHD, and large vessel obstruction (2). All of these complications lower the quality of life and increases the morbidity as well as mortality in big numbers (3). Thyroid disorders are also prevalent among population; however, the prevalence is not as high as diabetes. Since both

disorders are endocrine in nature, there was always a curiosity to find out the association between these two. This association has been recognized long ago although the prevalence of thyroid disorders in patients of diabetic mellitus varies widely between studies (4).

Thyroid hormone and insulin both are associated with cellular metabolism and hence the excess or absence of one or both can possibly cause the functional derangement of the other hormone. Nowadays the sensitivity and specificity of thyroid

hormones are greatly enhanced by thyroid functions assessment (5). Various researches reported that presence of insulinitis, autoantibodies and reactive T-cell in patients of Type 1 DM. These autoantibodies include some organ specific strong association with HLA genes and also with remission of the disease course with immune-modulator treatment (6). Association of thyroid disorder and diabetes mellitus type 1 may be autoimmune with low T3 and low TSH which response to TRH (7).

The present study was carried out to find out the association between the type 2 diabetes mellitus and thyroid disorders. The present study also aimed to find out the estimated prevalence of thyroid disorders along with spectrum of thyroid dysfunction in the Type 2 diabetes mellitus patients.

MATERIALS & METHODS

The present retrospective study was conducted our tertiary care hospital. A total of 100 patients and 100 controls were enrolled for study, which were attending the OPD of General Medicine Department of GMERS Medical College, Vadnagar, Gujarat. The diagnosed patients with type 2 diabetes were enrolled for study by simple random sampling. The control group comprises of 100 healthy subjects without diabetes mellitus of any type. Clearance from Institutional Ethics Committee was taken before start of study and written informed consent for the study purpose was obtained from all the enrolled participants. All the participants were subjected to a pretested proforma and demographic data recorded such as age, gender, weight, height, educational and marital status along with detailed clinical examination. Body Mass Index (BMI) used to know the obesity criteria according to the WHO standards. Patients who had previously known thyroid diseases like thyroid carcinomas or who underwent thyroidectomy for any cause and those who not gave consent for thyroid examination or lab investigations were excluded from the study. Patients who had chronic debilitating diseases such as hypertension, cardiac diseases, liver and renal diseases, cancer and lactating or pregnant women were excluded from the study. All the study participant were undergone for

blood investigation for thyroid function test, HbA1c levels and random blood sugar levels and data were recorded in a proforma. The data were analyzed using MS Excel 2010, Epi Info v7 and SPSS v22.

RESULTS

In the present study total 200 subjects were enrolled, out of them 100 were the patients suffering from type 2 diabetes mellitus and 100 were the healthy controls. Among the case group mean age was 41 ± 8.3 out of them 58% were male and 42% were female. Among the control group mean age was 38 ± 7.2 out of them 61% were male and 39% were female. Anthropometric measurements were done in both the groups and mean value of BMI of control group was 28.1 ± 3.6 and mean value of BMI of type II diabetes group was 30.1 ± 5.4 . (Table 1)

On the clinical and lab investigation of both the groups it was found that the mean Hb1ac levels of control group was 5.2 ± 0.6 and mean Hb1ac levels of type II diabetes group was 8.6 ± 1.4 . Mean value of serum TSH levels among control group was 3.1 ± 2.0 and mean serum TSH among type II diabetes group was 4.1 ± 2.8 . Mean value of serum FT4 levels among control group was 1.3 ± 0.4 and mean serum FT4 levels among type II diabetes group was 1.4 ± 0.7 . Dyslipidemia was found in 11% of subjects in control group and 52% of subjects among type II diabetes group. (Table 2)

The magnitude of Thyroid Dysfunction among the control group was 12% and among the type II diabetes group was 34%. The magnitude of subclinical hypothyroidism among the control group was 8% and among the type II diabetes group was 19% ($p=0.743$). The magnitude of Clinical Hypothyroidism among the control group was 3% and among the type II diabetes group was 12% ($p=0.461$). The magnitude of subclinical hyperthyroidism among the control group was 1% and among the type II diabetes group was 2% ($p=0.612$). The magnitude of Clinical hyperthyroidism among the type II diabetes group was 1% and it was absent among the control group (0.745) (Table 3).

Table 1: Demographic variables of study participants

Variables	Control group (n=100)	Type II diabetes group (n=100)
Age (Mean ± SD)	38±7.2	41±8.3
Male	61	58
Female	39	42
BMI (Kg/m ²)	28.1±3.6	30.1±5.4

Table 2: Clinical variables of study participants

Variables	Control group (n=100)	Type II diabetes group (n=100)
HbA1c levels (%)	5.2±0.6	8.6±1.4
TSH levels (μUI/mL)	3.1±2.0	4.1±2.8
FT4 (μUI/mL)	1.3±0.4	1.4±0.7
Dyslipidemia	11	52

Table 3: Distribution of types of Thyroid disorders among the study subjects.

Type of thyroid disorder	Control group (n=100)	Type II diabetes group (n=100)	p-value
Subclinical hypothyroidism	8	19	0.743
Clinical Hypothyroidism	3	12	0.461
Subclinical hyperthyroidism	1	2	0.612
Clinical Hyperthyroidism	0	1	0.745
Total	12	34	

DISCUSSION

Diabetes Mellitus is the most common endocrine metabolic disorder seen among all other metabolic disorders. Thyroid hormone and insulin both are associated with cellular metabolism and hence the excess or absence of one or both can possibly cause the functional derangement of the other hormone. Nowadays the sensitivity and specificity of thyroid hormones are greatly enhanced by thyroid functions assessment (8). In the present study the estimated magnitude of Thyroid disorders among the control group was 12% and among the type II diabetes group was 34%.

This finding was in contrast with study conducted by Palma et al among patients who had diabetes mellitus to know the prevalence of thyroid disorders and they found prevalence of thyroid disorders among diabetic patients was 14.7%. Among them the frequency of newly diagnosed cases of thyroid dysfunction was 13%. The most common cases of thyroid dysfunction were of subclinical hypothyroidism, which was 13% among control group and 12% among type II diabetes group. They also evaluate the levels of anti-TPO antibodies and found that the overall magnitude was 10.8% (9). Findings of the present study were also contrary and higher prevalence rates than data reported by studies conducted by study of Fremantle et al, they reported the prevalence of thyroid disorders among diabetic patients was 8.6% (10) and likewise in the study conducted by Chuet cols et al, they reported prevalence of thyroid disorders among diabetic patients was 8.4% (11).

In the present study the most common thyroid dysfunction found was subclinical hypothyroidism and magnitude of subclinical hypothyroidism among the enrolled control group was 8% and among the type II diabetes group was 19% (p=0.743). Though this difference was not statistically significant but this high prevalence in case group may be because of presence of several autoimmune factors which were prevalent among type II diabetes group. Hence to know the association between thyroid disorders and autoimmune factors it would be require assay for autoimmune antibodies and since it was non funded

study it was the limitation of the present study. These findings were contrary to the data reported by the NHANES study (12).

Similar results were reported in a study conducted by Ramos et al on thyroid disorders among diabetic patients and thyroid dysfunction was found in 21% patients, 9% patient had overt hypothyroidism out of them 5% had subclinical hypothyroidism and 7% out of total had thyroiditis without any thyroid dysfunction. Hyperthyroidism was reported among only one percent of patient. Thyroid dysfunction was significantly associated patients age and no significant association was reported for duration of diabetes (13). Similar results also reported in a study conducted by Souza et al to know the estimated prevalence of thyroid disorders among patients who had diabetes mellitus and found that Autoantibodies were positive in 31% of patients with highest prevalence among age group of more than 18 years which was 35.7% (p value = 0.22). 40% of the patients had thyroid dysfunction with positive autoantibodies while only 4.4% positive autoantibodies without thyroid dysfunction (p<0.001) (14).

Hence thyroid dysfunction is a prevalent condition in patient with diabetes mellitus and it has to be evaluate by screening among all the patients who had diabetes mellitus and if facilities available antibody assay should be done for the diagnosis and management. The present study had some limitations like facilities not available for antibody assay and also simple random sampling technique adopted for the selection of the participants.

CONCLUSION

We concluded from the present study that the higher prevalence of thyroid dysfunction was observed among the type 2 diabetic group in comparison to healthy controls, though the difference was not statistically significant. The most prevalent thyroid dysfunction found in our study was the subclinical hypothyroidism among both the study groups which was also non-significantly associated. Since present study was done with small sample size, hence further

elaborative studies required for generalization of study results.

REFERENCES

1. S.N DR, Champakamalani D, Venkatesh D, Mohsin D. A prospective study of thyroid - dysfunction in patients with Type 2 diabetes in general population. Arch Med [Internet]. 2013;5(1):1–9. Available from: <http://imedpub.com/ojs/index.php/archmedicine/>
2. Chawla A, Chawla R, Jaggi S. Microvascular and macrovascular complications in diabetes mellitus: Distinct or continuum? Indian J Endocrinol Metab [Internet]. 2016;20(4):546–51. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27366724>
3. Cade WT. Diabetes-related microvascular and macrovascular diseases in the physical therapy setting. Phys Ther [Internet]. 2008 Nov;88(11):1322–35. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18801863>
4. Wang C. The Relationship between Type 2 Diabetes Mellitus and Related Thyroid Diseases. J Diabetes Res [Internet]. 2013;2013:390534. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23671867>
5. Chaker L, Ligthart S, Korevaar TIM, Hofman A, Franco OH, Peeters RP, et al. Thyroid function and risk of type 2 diabetes: a population-based prospective cohort study. BMC Med [Internet]. 2016 Sep 30;14(1):150. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27686165>
6. Wenzlau JM, Hutton JC. Novel diabetes autoantibodies and prediction of type 1 diabetes. Curr Diab Rep [Internet]. 2013 Oct;13(5):608–15. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23900975>
7. Hage M, Zantout MS, Azar ST. Thyroid disorders and diabetes mellitus. J Thyroid Res [Internet]. 2011;2011:439463. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21785689>

8. Hussain KSA. Thyroid dysfunction in patients with diabetes mellitus at Puducherry , India : a retrospective study. 2018;5(4):822–4.
9. Palma CCSSV, Pavesi M, Nogueira V, Clemente EL, Vasconcellos M de FBMP, Pereira L, et al. Prevalence of thyroid dysfunction in patients with diabetes mellitus. *Diabetol Metab Syndr* [Internet]. 2013 Oct 9;5(1):58. Available from: <http://dmsjournal.biomedcentral.com/articles/10.1186/1758-5996-5-58>
10. Chubb SAP, Davis WA, Inman Z, Davis TME. Prevalence and progression of subclinical hypothyroidism in women with type 2 diabetes: the Fremantle Diabetes Study. *Clin Endocrinol (Oxf)* [Internet]. 2005 Apr;62(4):480–6. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15807880>
11. Chen H-S, Wu T-EJ, Jap T-S, Lu R-A, Wang M-L, Chen R-L, et al. Subclinical hypothyroidism is a risk factor for nephropathy and cardiovascular diseases in Type 2 diabetic patients. *Diabet Med* [Internet]. 2007 Dec;24(12):1336–44. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17941864>
12. Hollowell JG, Staehling NW, Flanders WD, Hannon WH, Gunter EW, Spencer CA, et al. Serum TSH, T₄, and Thyroid Antibodies in the United States Population (1988 to 1994): National Health and Nutrition Examination Survey (NHANES III). *J Clin Endocrinol Metab* [Internet]. 2002 Feb;87(2):489–99. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/11836274>
13. Ramos AJS, Costa ADM da, Benicio AVL, Ramos ALC, Silva CRA, Carvalho CR de, et al. Prevalência de doença tireoideana em pacientes com diabetes tipo 1. *Arq Bras Endocrinol Metabol* [Internet]. 2003 Apr;47(2):177–82. Available from: http://www.scielo.br/scielo.php?script=sci_
V, Carrilho AJF, Oliveira ML de, et al. Prevalência de auto-imunidade tireoidiana em um grupo de pacientes com diabetes mellitus tipo 1 em Londrina, PR. *Arq Bras Endocrinol Metabol* [Internet]. 2005 Apr;49(2):228–33. Available from: http://www.scielo.br/scielo.php?script=sci_
14. Souza OLR, Diehl LA, Carleto Jr. LD, Garcia