

Study on Thyroid Dysfunction in Patients with Type-2 Diabetes in Tertiary Care Center

Srilatha Choppa¹, Revathi Mudduluru², Bulla Anil Kumar^{3*}

¹Assistant Professor, Department of Physiology, Government Medical College & Hospital, Ongole, Andhra Pradesh

²Associate Professor, Department of Physiology, Government Medical College & Hospital, Ongole, Andhra Pradesh

^{3*}Assistant Professor, Department of General Surgery, Government Medical College & Hospital, Ongole, Andhra Pradesh

Received: 15-06-2023 / Revised: 18-07-2023 / Accepted: 30-08-2023

Corresponding Author: Dr. Bulla Anil Kumar

Conflict of interest: Nil

Abstract

Introduction: The two most frequent endocrine disorders in clinical practice are diabetes mellitus (DM) and thyroid dysfunction (TD). Several studies have demonstrated that diabetes and thyroid diseases influence each other and that both disorders coexist. The purpose of this study was to determine the relationship between type 2 diabetes and thyroid dysfunction in patients with type 2 diabetes.

Materials and Methods: The present cross-sectional study was done on 50 T2DM patients and 50 non diabetic healthy subjects in a tertiary care teaching center. A medical history was taken, and venous blood samples were collected for investigations like FBS (Fasting blood sugar), PPBS (Postprandial blood sugar), TSH (Thyroid stimulating hormone), T3 (Triiodothyronine), and T4 (Tetraiodothyronine). Data were analyzed using SPSS version 16. p value <0.05 was considered statistically significant.

Result: In the study group there were 20 males and 30 females, whereas in the control group there were 19 males and 31 females. The mean age in control was 53.54 ± 5.76 years & cases was 54.65 ± 7.64 years and this difference was not statistically significant. In 50 diabetes mellitus group, 15 (30%) were having thyroid dysfunction. Out of them, Hyperthyroidism was seen in 1 patient, Hypothyroidism was seen in 5 patients, Subclinical Hyperthyroidism was seen in 1 patient & subclinical Hypothyroidism was seen in 8 patients Which was statistically significant Out of 15 cases with thyroid dysfunction, 3 were males and 12 were females Which was statistically significant. In 50 Non- diabetes mellitus group, 4 (8%) were having thyroid dysfunction. Out of them, Hyperthyroidism was seen in 1 patient, Hypothyroidism was seen in 2 patients, & subclinical Hypothyroidism was seen in 1 patient Which was statistically significant. Out of 4 controls with thyroid dysfunction, 1 was male and 3 were females Which was statistically significant.

Conclusion: Thyroid dysfunction was found to be more prevalent in diabetic subjects in comparison to controls. Therefore, it is important to regularly screen diabetes patients for thyroid dysfunction in order to identify these disorders early on and aid to improve their quality of life and lower their morbidity rate.

Keywords: Thyroid dysfunction, Thyroid Stimulating Hormone, Type II Diabetes Mellitus.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Diabetes mellitus is a group of common metabolic disorders characterized primarily by hyperglycemia, which is the result of either insufficient insulin action or secretion, or both [1]. Diabetes Mellitus, the most common endocrine disease, is characterized by metabolic abnormalities and by long term complications involving the eyes, kidneys, nerves and blood vessels. [2]

The second most prevalent endocrinopathy in adults is thyroid dysfunction. Since cellular metabolism is closely regulated by both thyroid and insulin hormones, an imbalance in one of these hormones may

cause a functional disorder in the other. In clinical practice, the two most frequent endocrine illnesses seen are diabetes mellitus and thyroid disorders. Thyroid disorders and diabetes have been demonstrated to affect one another, and there has long been evidence of a connection between the two. [3,4,5]

The presence of thyroid dysfunction in type 2 diabetes mellitus worsens macrovascular and microvascular consequences, morbidity, mortality, and quality of life. [6] Detecting thyroid gland dysfunction in type 2 diabetes would allow doctors to provide appropriate treatment for metabolic

disorders, as thyroid problems such as hypothyroidism can compromise glycemic control and other comorbidities. Functional changes in the thyroid gland may be related to metabolic syndrome with its associated factors which include obesity, insulin resistance (IR), raised blood pressure, lipid and glucose metabolism abnormalities, and cardiovascular dysfunction. [7,8]

Thus, the present study was conducted to find out the relationship between type 2 DM & thyroid dysfunction in patients with type 2 diabetes

Materials and Methods:

A Prospective cross sectional study was undertaken by Department of Physiology, Government Medical College and Hospital, Ongole, Andhra Pradesh. The study was being conducted over a period of six months from October 2022 to March 2023 to find out the correlation of diabetes and thyroid disorders. Total 100 subjects were included in the study. 50 out of 100 were diabetic and remaining 50 who were non diabetic were taken as control group. The patients of more than 45 yrs of age group who visited Medicine OPD for their regular diabetes checkup and another group of subjects of same age matched healthy volunteers who were the controls were subjected to thyroid function test and blood glucose levels.

Criteria for Inclusion and Exclusion:

All the known type II NIDDM patients attending diabetes OPD for more than 5 yrs duration were the cases and the subjects in the control group for this study were age matched healthy volunteers.. Participants having Known thyroid function disorder, DM with complication like retinopathy nephropathy and neuropathy Alcoholic, smokers, hypertension were not allowed to participate in this study.

Thyroid function tests T3, T4, and TSH as well as fasting and postprandial blood glucose levels, were performed on all individuals. Increased TSH with decreased values of T3 & T4 was taken as

hypothyroidism. Decreased TSH with raised T3 & T4 level were taken as hyperthyroidism. Individual variation of TSH i.e. increase TSH with normal T3, T4 levels were taken as subclinical hypothyroidism and decrease TSH with normal T3 & T4 values was taken as subclinical hyperthyroidism. Isolated deranged values of T3, T4 were also noted accordingly. Blood glucose level was estimated by fully automated biochemistry analyzer dimension and thyroid profile assay (immulite) by Chemiluminescence Method by SIEMENS.

The data was tabulated and statistical analysis was done by using SPSS, Version 16. Comparison between two groups was done by using chi-square test. P value less than 0.05 was considered as statistically significant.

Our normal ranges were as follows.

T3: 70 – 200 ng/dl

T4: 4.8 – 13.5 ug/ dl

TSH: 0.4 – 4.0 MIU/ml

Fasting blood glucose: 70-110 mg/dl

Postprandial blood glucose: <140 mg/dl.

Result:

In the study group there were 20 males and 30 females, whereas in the control group there were 19 males and 31 females.

The mean age in control was 53.54 ± 5.76 years & cases was 54.65 ± 7.64 years and this difference was not statistically significant. The T3 mean in cases was 106.47 ± 45.23 as compared to controls 142.87 ± 86.54 & this difference was statistically Significant. The mean T4 in cases was 7.86 ± 6.23 as compared to controls 10.75 ± 16.76 . & this difference was statistically significant. The TSH mean in cases was 5.97 ± 9.87 more as compared to control 5.12 ± 9.54 & this difference was statistically significant. Both FBS & PPBS were statistically significant in cases & controls as shown in Table 1.

Table 1: Comparison of age & clinical parameters between the study groups

parameter	Cases (n=50) (Mean \pm SD)	Control (n=50) (Mean \pm SD)	p-value
Age	54.65 ± 7.64	53.54 ± 5.76	0.156
T3	106.47 ± 45.23	142.87 ± 86.54	0.03*
T4	7.86 ± 6.23	10.75 ± 16.76	0.04*
TSH	5.97 ± 9.87	5.12 ± 9.54	0.02*
FBS	138 ± 21.76	101.12 ± 15.09	0.002*
PPBS	217.98 ± 35.12	121.65 ± 12.45	0.001*

* Significant

In 50 diabetes mellitus group, 15 were having thyroid dysfunction. Out of them, Hyperthyroidism was seen in 1 patient, Hypothyroidism was seen in 5

patients, Subclinical Hyperthyroidism was seen in 1 patient & subclinical Hypothyroidism was seen in 8 patients. Out of 15 cases with thyroid dysfunction, 3

were males and 12 were females. In 50 Non-diabetes mellitus group, 4 were having thyroid dysfunction. Out of them, Hyperthyroidism was seen in 1 patient, Hypothyroidism was seen in 2 patients, &

subclinical Hypothyroidism was seen in 1 patient. Out of 4 controls with thyroid dysfunction, 1 was male and 3 were females as shown in Table 2

Table 2: Comparison of Thyroid dysfunction & Type of Thyroid between groups

parameter	Case (50)	Control (50)	Chi-square test	p-value
Thyroid dysfunction				
No	35 (70%)	46 (92%)	10.643	0.001*
Yes	15 (30%)	4 (8%)		
Gender (with Thyroid dysfunction)				
Male	3	1	13.125	0.001*
female	12	3		
Type of Thyroid				
Hyperthyroidism	1 (2%)	1 (2%)	11.542	0.002*
Hypothyroidism	5 (10%)	2 (4%)		
Subclinical Hyperthyroidism	1(2%)	0 (0%)		
Subclinical Hypothyroidism	8(16%)	1 (2%)		

* Significant

Discussion:

Patients with type 2 diabetes who also have thyroid dysfunction will have worsening macrovascular and microvascular problems, as well as worse morbidity and mortality rates and a lower quality of life. [9] The focus on thyroid dysfunction and its impact on different end organs in diabetes has not received as much attention as it should because most attention is directed toward these serious complications. A cross-sectional study was conducted on 50 type-2 Diabetes mellitus patients and 50 normal subjects without type-2 diabetes presenting to the outpatient clinic.

In our study 30 % i.e 15 out of 50 patients suffering from diabetes mellitus had abnormal thyroid profile as compared to 8% i.e 4 out of 50 among the control group. This support the findings of various other authors who have also noted that thyroid dysfunction is more common to co-occur in people with diabetes Mellitus than in people with out diabetes Mellitus. [10,11] Thyroid dysfunction was found to be more prevalent in females than the male diabetics which correlates with other studies. [11,12,13]

Conclusion: in the present study, thyroid dysfunction was found to be more prevalent in diabetic subjects in comparison to controls. Therefore, it is important to regularly screen diabetes patients for thyroid dysfunction in order to identify these disorders early on and aid to improve their quality of life and lower their morbidity rate. [14,15]

References:

1. Shekhar Chandra Yadav, Alwin Saldhana, Biswajit Majumdar. Status of Thyroid profile In Type-2 Diabetes Mellitus. Journal of Nobel Medical College. 2012; 2:64.
2. Daniel WF. Principles of Internal Medicine: Anthony SF *et al.*, 14th. The McGraw-Hill Companies, Inc, 1998; 2060.
3. Feely J, Isles TE. Screening for thyroid dysfunction in diabetics. British Medical Journal, 1979; 1: 1678.
4. Gray SR, Irvine JW, Clarke FB. Screening for thyroid dysfunction in diabetics. British medical journal, 1979; 2:1439.
5. Hage M, Zantout SM, Azar TS. Thyroid disorders and diabetes mellitus. Journal of thyroid research 2011.
6. Wang C. The Relationship between Type 2 Diabetes Mellitus and Related Thyroid Diseases. J Diabetes Res. 2013;2013:390534.
7. Deshmukh V, Farishta F, Bhole M. Thyroid Dysfunction in Patients with Metabolic Syndrome: A Cross- Sectional, Epidemiological, Pan-India Study. Int J Endocrinol. 2018; 2018: 2930251.
8. Chang CH, Yeh YC, Caffrey JL, Shih SR, Chuang LM, Tu YK. Metabolic syndrome is associated with an increased incidence of subclinical hypothyroidism - A Cohort Study. Sci Rep. 2017;7:6754.
9. Wang C. The Relationship between Type 2 Diabetes Mellitus and Related Thyroid Diseases. J Diabetes Res. 2013;2013:390534.
10. Bal BS, Kaur PP, Singh MB, Singh G, Singh PS. Prospective analysis of thyroid

- abnormalities in cases of Type 2 diabetes mellitus. *J Assoc Phys India* 2003; 51:1165.
11. Bharadiya Amit A *et al.*, Evaluation of thyroid function tests in patients with uncontrolled type 2 diabetes mellitus: *International J of Health Science and Research*.2014; 4(5): 129-138.
 12. Palanisamy P, Govindaswamy B, Ganesan S,Ramachandran S. Screening for thyroid dysfunction in diabetic/ Non diabetic population. *Journal of thyroid science* 2008; 3(8).
 13. G, Marwaha TS, Khurana A, et al. Prevalence of thyroid disorders in patients of type 2 diabetes mellitus. *IJMDS*. 2013;2(2).
 14. Setare Nassiri, Mohammad Vakili, Hamide Gholami and Setare Akhavan 2018. Prevalence of thyroid dysfunction in patients of type 2 diabetes mellitus: hospital based prospective study. *International Journal of Current Research*, 2018; 10(03): 67031-67034.