



STUDY OF THE STATUS OF THYROID HORMONES IN PATIENTS WITH T2DM OF DIFFERENT AGE GROUPS

Dr. Chandan Kumar Kashyap

Medical Institute Jorhat, Jail Road, P:O-Barbheta, Jorhat- 785004, Assam, India

Dr. Saurabh Borkotoki*

Professor & Head, Department of Biochemistry, Jorhat Medical College, Jorhat-785001, Assam, India *Corresponding Author

ABSTRACT

Aims and objectives:- Study of the status of thyroid hormones in patients with T2DM of different age groups.

Materials and method:- It was a hospital based case control study, conducted upon 50 known cases with type 2 diabetes mellitus those who are either admitted in the medicine ward or attended medicine OPD of Jorhat Medical College & Hospital. during the six months of study period (1st september 2015 to 31st march 2016).

Results:- In the age group 45 ≤50 years, the no cases studied were maximum i.e. 23, And the lowest, i.e. 3 in the age group 60 years. Age group wise comparison of distribution of thyroid dysfunction among cases showed statistically significant p values in the age group 40≤45 years (p=0.0047*) and 45≤50 years. (p=0.0035*)

KEYWORDS : Type 2 Diabetes Mellitus, Thyroid hormone, Thyroid dysfunction

Introduction:-

All over the world the prevalence of type 2 diabetes has increased in a alarming rate in past two decades. The effects of diabetes mellitus include long-term damage, dysfunction and failure of various organs. The metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ systems that impose a tremendous burden on the individual with diabetes and on the health care system. The world wide researchers have found that there is increased incidence of cases of thyroid dysfunction among the patients suffering from T2DM. Taking account of this strong link, American Diabetes Association (ADA) has passed a guideline.[1] According to that, people with diabetes mellitus must be checked periodically for thyroid dysfunction. And also patients those are suffering from thyroid dysfunction is to be tested for possibility of abnormal glucose metabolism.

These endocrinopathies influence each other in multiple ways. Poorly controlled diabetes mellitus may affect thyroid metabolism as uncontrolled hyperglycemia alters plasma triiodothyronine (T3) and in part thyroxine (T4) levels. [2] Hepatocyte plasma membrane concentration of GLUT 2 is increased by thyroid hormone and it leads to increased hepatic glucose output and abnormal glucose metabolism.[3] Since the thyroid gland plays a central role in the regulation of metabolism, abnormal thyroid function can have a major impact on the control of diabetes. In addition, untreated thyroid disorder can increase the risk of certain diabetic complication and can aggravate many diabetes symptoms.. For all of these reasons, periodic screening for thyroid disorder should be considered in all people with diabetes.[4] Most recently it was found that person with T2DM with untreated thyroid disorder is at increased risk of complications of diabetes mellitus and also have affects in the control of the diabetes.[4]

People with diabetes have an increased risk of developing thyroid disorder. In the general population, approximately 6% of people have some form of thyroid disorder. However, the prevalence of thyroid disorder increases to over 10% in people with diabetes. Since people with one form of autoimmune disorder have an increased chance of developing other autoimmune disorders.[4]

This study is aimed at to assess the presence of different forms of thyroid dysfunction among type 2 diabetes mellitus attending Jorhat Medical College & Hospital. [4]

Aims and objectives:-

To study the status of thyroid hormones in patients with T2DM of different age group attending Jorhat Medical Collage & Hospital.

Materials and methods:-

It was a hospital based case control study, conducted upon 50 known cases with type 2 diabetes mellitus those who are either admitted in the medicine ward or attended medicine OPD of Jorhat Medical College &

Hospital. during the six months of study period (1st september 2015 to 31st march 2016).

PLACE OF STUDY

Department of Biochemistry
Clinical Biochemistry wing of Central Clinical Laboratory (CCL),
Jorhat Medical College Hospital, Jorhat

DURATION OF STUDY:- Six months (1st september 2015 to 31st march 2016).

SAMPLE SIZE:- No. of cases : 50 (fifty)
No of controls : 50 (fifty)

TYPE OF STUDY:- Hospital based Case Control Study.

SELECTION OF CASES:- Patients were selected randomly.

STUDY POPULATION:-

All the known cases with type 2 diabetes mellitus who attended and/or admitted in the Department of Medicine, Jorhat Medical College and Hospital during the period of six months (1st september 2015 to 31st march 2016).

CRITERIA FOR SELECTION OF CASES:-

Inclusion criteria

- 1) Known cases of type 2 diabetes mellitus under treatment either on oral hypoglycemic agents or insulin.
- 2) Age: 40 to 65 years.

Exclusion criteria

- 1) Cases with known thyroid disorder on treatment for hypo or hyperthyroidism.
- 2) Patients receiving medications like Amiodarone, Antithyroid drugs, Thyroxin, Iodine, OCP and drugs that may alter thyroid functions were excluded.
- 3) Use of medications that interfere with glucose homeostasis (i.e. corticosteroids, thiazolidinedione).
- 4) Diabetes mellitus with complication like retinopathy, nephropathy & neuropathy.
- 5) Type I diabetes mellitus.
- 6) Pregnant women.

DATA COLLECTION:-

The patients of T2DM were included into the study after taking written informed Consent. The patients were interviewed and complete general and systemic examinations were done considering inclusion and exclusion criteria using proforma.

PROCEDURE FOR SPECIMEN COLLECTION AND PRESERVATION :-

Under aseptic and antiseptic condition 5 ml of the blood sample

collected from each subject from a suitable peripheral vein (preferably antecubital vein) by venipuncture using sterile disposable syringe and divided into a clot, of Medicine and CCL collection center JMCH., fluoride vials are used for blood glucose estimation and clotted vials are used for estimation of T₃, T₄ and TSH. all other samples are then allowed to stand for sometime and then centrifuged for separation of serum. T₃, T₄ and TSH were tested in Access Immuno Assay Systems (Beckman Coulter).

All samples were processed according to existing standard laboratory guidelines on the same day. Adequate precautions were taken, as required, for estimation.

**TEST PROCEDURES:-
THYROID HORMONAL ASSAY**

Estimation of T₃, T₄, TSH level

1) T₃

Method used: Competitive binding immunoenzymatic assay.

Normal reference level: 0.87-1.78 ng/mL

2) T₄

Method used

Competitive binding immunoenzymatic assay.

Normal reference level: 6.09-12.23 µg/dL

3) TSH

Method used: Two site immunoenzymatic (“Sandwich”) assay.

Normal reference level:- 0.34-5.00 µIU/mL

Quality control:-

QC (Quality control) material simulate the characteristics of patients samples are commercially available and supplied by the manufacturers-Beckman Coulter, were used. Quality control materials were run every 24 hours time for authenticity of reports. These QC materials cover at least two levels of the analyte. The test results were accepted only when quality control results were found to be within acceptable ranges.

Results:-

Results of the tests were determined automatically by the systems software. The amount of analyte in the sample was determined from the measured light production by means of calibration data.

Statistical analysis:- Statistical analysis of the datas were done using Microsoft excel.

TABLE 1. AGE WISE DISTRIBUTION OF SUBJECTS STUDIED

Age (years)	Cases	Controls
40 ≤ 45	8	22
45 ≤ 50	23	18
50 ≤ 55	11	6
55 ≤ 60	5	2
60	3	2
Total	50	50

NP- The Table 1. shows that in the age group 45 ≤ 50 years, the no cases studied were maximum i.e. 23, and no of controls were maximum i.e. 22, in the age group 40 ≤ 45 years. And the lowest no of the cases i.e. 3 were found in the age group 60 years.

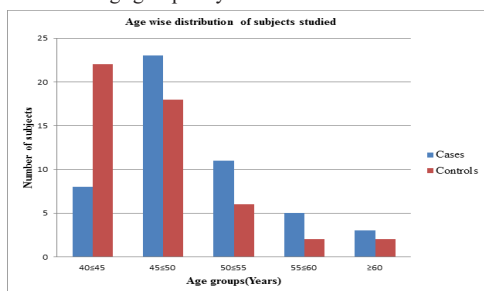


FIG. 1. BAR DIAGRAMMATIC REPRESENTATION OF AGE WISE DISTRIBUTION OF SUBJECT STUDIED.

Thyroid hormone dysfunction was found higher mostly in the age group of 45 ≤ 50 years. (24%), of which out of the total 23 cases 4 cases

were with altered thyroid function, The p value was found to be statistically significant i.e. 0.0035*.

TABLE 2. AGE WISE DISTRIBUTION OF THYROID DYSFUNCTION AMONG CASES

Age	Cases with thyroid disorder	Cases without thyroid disorder	P value
40 ≤ 45 (n=8)	0	8	0.0047*
45 ≤ 50 (n=23)	4	19	0.0035*
50 ≤ 55 (n=11)	4	7	0.5448
55 ≤ 60 (n=5)	4	1	0.067
60 (n=3)	2	1	0.2207

* Significant,

NP- In this Table 2. - Age group wise comparison of distribution of thyroid dysfunction among cases showed statistically significant p values in the age group 40 ≤ 45 (p= 0.0047*) and 45 ≤ 50 (p= 0.0035*) years.

Discussion:-

In the present study the cases belong to the age group of 40 to 65 years. As our study is mainly based on T2DM which usually occur after the fourth decade. During the study we have taken 8 cases (40 ≤ 45 years), 23 cases (45 ≤ 50 years), 11 cases (50 ≤ 55 years), 5 cases (55 ≤ 60 years) 3 cases (≥ 60 years). From the above observation it is clear that the highest number of cases were found in the age group of 45 ≤ 50 years and lowest number of cases were found in age group ≥ 60 years. In the present study maximum number of cases belong to the age group of 45 ≤ 50 years, because of the reason that the complications of T2DM starts appearing 5-10 years after the onset of the disease. Maximum number of controls were in the age group 40 ≤ 45 years. This is because that the study was a hospital based study and the controls were taken from that healthy hospital employees like nurses, boys and girls. The lowest no of the cases i.e. 3 were in the age group ≥ 60 years. This may be because of the fact that, people suffering from T2DM die early due to complications.

In the age group of 45 ≤ 50 years out of total 23 cases 4 cases were with altered thyroid status. The p values was also statistically significant (0.0035*). In the present study the no. of cases with altered activity is found to be 14, which is 28% of the total cases studied. There were no cases with thyroid dysfunction below the age of 45 years and all the cases were belong to the older age groups.

It can be assumed that as the age advances control of the blood sugars gradually deteriorates due increase in the complications of the disease because of the prolong exposure to the disease and its ill effects. The effects of diabetes mellitus include long-term damage, dysfunction and failure of various organs including thyroid. The number of cases with altered thyroid function were 4 each in the age group of 45 ≤ 50, 50 ≤ 55 & 55 ≤ 60 and 2 were found in the age group ≥ 60 years accounting for 14 cases (28%) of thyroid hormone dysfunction. When they are compared with the cases without thyroid hormone dysfunction. P values were found statistically significant in age groups 40-44 and 45-49 years, (p=0.0047)* and (p=0.0035)* respectively.

In the present study maximum number of cases belonged to the age group of 45 ≤ 50 years, because of the reason that the complications of T2DM starts appearing >5-10 years after the onset of the disease. Maximum number of controls were in the age group 40 ≤ 45 years. This is because that the study was a hospital based study and the controls were taken from that healthy hospital employees like nurses, ward boys and ward girls. The lowest no of the cases i.e. 3 were in the age group ≥ 60 years. This may again be because of the fact that, people suffering from T2DM die early due to complication.

Conclusion:- From the above study it was found that altered thyroid function is quite common in the patients with T2DM attending JMCH. It was observed that the age group, mostly affected with altered thyroid function was 45 ≤ 50 years. The relation of the thyroid hormone status with that of T2DM may have important clinical and diagnostic

relevance. The clinical relevance relates to potential preventive and therapeutic approaches, whereas the diagnostic relevance concerns the diagnostic utility of detection of different types of thyroid disorders and associated cardiovascular risk that can be easily measured in clinical laboratory and applied in the medical practice.

References:-

- 1) Geffari, M. A., Ahmed, N. A., Ahmed, H. A. S., Yussef, A. M., Naqeb, D. A., Rubeaan, K. A. (2013). Risk Factors for Thyroid Dysfunction among Type 2 Diabetic Patients in a Highly Diabetes Mellitus Prevalent Society. *International Journal of Endocrinology*. Article ID 417920: 6 pages.
- 2) Saunders, J., Hall, S. E., Sonksen, P. H. (1978). Thyroid hormones in insulin requiring diabetes before and after treatment. *Diabetologia*. 15: 29–32.
- 3) Hage, M., Zantout, M. S., Azar, S. T. (2011). Thyroid disorders and Diabetes Mellitus. *Journal of Thyroid Research*. 2011; Volume May; Article ID 43946: 7 pages.
- 4) Wu P. Thyroid Disorders and Diabetes. [Internet] Available at [http://www. Diabetes self management.com/about-diabetes/general-diabetes-information/ thyroid -disorders-and-diabetes](http://www.Diabetes self management.com/about-diabetes/general-diabetes-information/thyroid-disorders-and-diabetes).
- 5) Gornall, A. G., Luxton, A. W., Bhavnani, B. R. (1986). Endocrine disorders. In *applied biochemistry of clinical disorders*. Edited by Gornall, AG Philadelphia, PA: J. B. Lippincott Co. pp. 305-318.
- 6) Watts, N. B., Keffer, J. H. (1982). The thyroid gland. In *Practical endocrine diagnosis*. Philadelphia, PA: Lea & Febiger. Page No. 77-96.