ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 8 | August - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

PREVALENCE OF THYROID DYSFUNCTION IN TYPE 2 DIABETES MELLITUS IN SOUTH INDIAN SUBJECTS

Biochemistry

Jhansi Rani C* Departments of Biochemistry, GMC, Secunderabad. *Corresponding Author
SarojiniC General Medicine Senior Resident RIMS, Ongole.

ABSTRACT

Introduction: Thyroid diseases and diabetes mellitus are the two most common endocrine disorders encountered in clinical practice which have been shown to mutually influence each other and association between both the conditions has long been reported. The present study aimed to find the prevalence of thyroid dysfunction with type 2 diabetes mellitus. **Aim:** The aim of the present study was to evaluate the prevalence of thyroid dysfunction in type 2 diabetes in south Indian subjects. **Materials And Methods:** A total of 100 subjects aged 20-70 years were selected from Gandhi Medical College,Secunderabad. Glucose was estimated by "GOD-PAP", enzymatic photometric test methodology. Thyroid profile was analyzed by chemiluminiscence immunoassay. **Results:** There was high prevalence of thyroid disorders in patients with type 2 Diabetes mellitus. Most common was hypothyroidism (8%), which was further found to be more in the age group>50 years (5%) in patients with uncontrolled Diabetes Mellitus i.e,FBS 217.5± 57.4. **Conclusion:** Screening of thyroid dysfunction should be done in all diabetic patients especially in patients with poor diabetic control.

KEYWORDS

Type 2 diabetes, Thyroid disorders, Hypothyroidism, TSH.

INTRODUCTION

The WHO reports suggests that the prevalence of diabetes in worldwide would increase to 300 million in the year 2025.(1). It is one of the main threats to human health in the 21st century and is the fifth leading cause of death in most developed countries (2).Thyroid dysfunction is a disorder of the thyroid gland which manifests as hyperthyroidism or hypothyroidism and is reflected in the levels of TSH (3).Diabetes and Thyroid disorders have been shown to mutually influence each other and associations between both conditions have long been reported. (4, 5).

Prevalence of thyroid dysfunction varied from 2.2%-17%in diabetes.(6).Diabetic women are more frequently affected than men and hypothyroidism is more common than Thyrotoxicosis.(7).Thyroid hormones are insulin antagonists, both insulin and thyroid hormones are involved in cellular metabolism. Excess or deficit of any one can result in functional derangement of the other.(8).Defective insulin secretion leads to various metabolic aberrations in Type 2 DM, spanning from hyperglycemia due to defective Insulin-stimulated glucose uptake and up regulated hepatic glucose production, along with dyslipidemia,which includes impaired homeostasis of fatty acids, triglycerides and lipoproteins.(9).

The presence of both high and low thyroid hormone levels in diabetics in this study may be due to modified TRH synthesis and release. (10).DM appears to influence thyroid function in two sites, firstly at the level of hypothalamic control of TSH release and secondly at peripheral tissue by converting T_4 to T_3.Hyperglycemia causes reduction in hepatic concentration of $T_{4\text{-}5}$deiodinase,low concentration of T_3, raised levels of reverse $T_3$and low, normal or high level of T_4(11). Thyroid hormones regulate metabolism and diabetes can alter metabolism. (12). The aim of the study was to evaluate the prevalence of thyroid dysfunction in type 2 Diabetes Mellitus in South Indian Subjects.

MATERIALS AND METHODS

Study Area

Gandhi Medical college and hospital, Secunderabad.

Study Period

3 months, June 2019 to August 2019

Study Design

A Prospective, descriptive Hospital based study

Study Population

The present study was carried out in the Department of Bio-chemistry Gandhi Medical College, Secunderabad. The patients were selected from those attended the medicine OPD at Gandhi Medical College and hospital, Secunderabad. The Investigations were carried out in Bio-Chemistry laboratory, Gandhi Medical College and hospital, Secunderabad.

Criteria For Selection

Inclusion Criteria

1.All diabetic subjects aged 20-70 years

Exclusion Criteria.

1.Previous history of thyroid disease co-existing Hepatobiliary disease
2.Pregnancy
3.Systemic drug therapy such as thyroxin, antithyroid drugs, glucocorticoids,oral contraceptives ,lithium, Amiodarone.
4.Chronic Renal Failure
5.Diabeticketoacidosis

Blood Sample Collection And Biochemical Markers

A venous blood sample was obtained from every volunteer into fluoride tubes (BD vacutainer system). All the blood samples were immediately carried to the Biochemistry Laboratory In a crushed ice block, Blood samples were centrifuged at 3000rpm for 10 minutes. The RBS was performed in plasma sample in fully automated analyzer (DS-302 vector Biotech); Glucose was estimated by "GOD-PAP", enzymatic photometric test methodology.Thyroid profile waes estimated in serum sample by chemiluminiscence immunoassy.Criteria used in the study for diagnosis of type 2 DM (According to American Diabetic Association) are 1) FBS (Fasting Blood Sugar) - ≥ 110 mg/dl and 2) RBS (Random Blood Sugar) - ≥ 200 mg/dl or taking hypoglycemic drugs and/or using insulin and did not have any ketosis in the past.

Normal range of the serum4 levels were 0.69-2.15 ng/ml for T3; 52-127ng/ml for T4 and 0.3-4.5 µIU/ml for TSH. A normal range for FBS is 70-110 mg/dl;

Guidelines for detection of thyroid dysfunction: Normal – when T3, T4 and TSH were in normal range Primary Hypothyroidism – when TSH more than 5.5mIU/ml and T3, T4 less than normal. Primary Hyperthyroidism – when TSH is less than 0.3mIU/ml and T3, T4 more than normal.

Ethics Approval

The study protocol was reviewed and approved by the Institutional Ethics committee, at Gandhi Medical College, Secunderabad, 2019, and informed consent form was obtained from all participants.

RESULTS

Table 1 shows the prevalence of hypothyroidism in males and females.In the present study,out of 100 diabetic patients ,8 patients had thyroid dysfunction. Most common thyroid disorder found was hypothyroism (8%).Prevalence of thyroid dysfunction in females % and in males 1% patients who have uncontrolled diabetes mellitus.

Table 1 : Prevalence of Hypothyroidism

HYPOTHYROIDISM		FREQUENCY	PERCENTAGE
YES	MALE	1	1%
	FEMALE	7	7%

NO	MALE	9	9%
	FEMALE	83	83%
TOTAL		100	100%

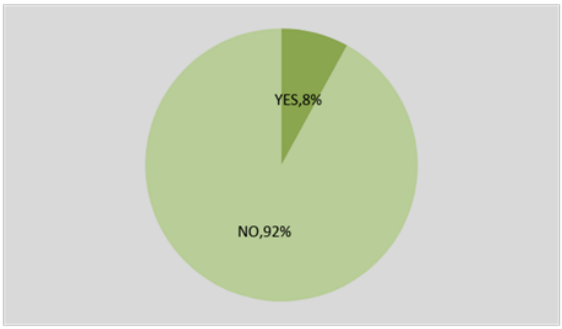

Fig 1: Prevalence of Hypothyroidism Diabetes

Table 2 : Age Wise Distribution Of Hypothyroidism

Age	Normal	Hypothyrodism	Normal FBS (Mean± SD)	Hypothyrodism FBS (Mean ±SD)
<40	75(75%)	1(1%)	102.64 ± 38.69	200 ± 00
40-50	12(12%)	2(2%)	124.33 ± 40.90	180 ± 48.08
>50	5(5%)	5(5%)	150.6 ± 134.84	217.5 ± 57.4
P-Value	0.0000001			

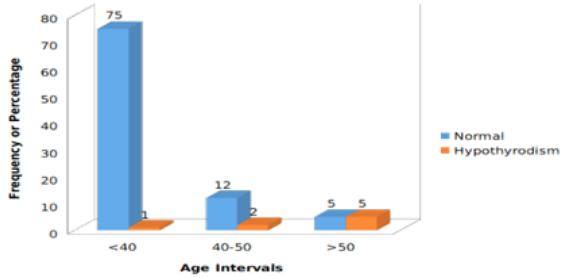

Fig 2 : Age Wise Distribution Of Hypothyroidism Diabetes

Table 2 shows Age wise distribution of hypothyroidism .In the present study in the age group <40 yrs prevalence of hypothyroidism was1% where the mean FBS 200.In the age group 40-50 yrs prevalence of hypothyroidism was2% where the mean FBS 180 ± 48.08. In the age group >50 yrs prevalence of hypothyroidism was 5% where the mean FBS 217.5 ± 57.4.Prevalence is higher with increasing age.

DISCUSSION:

Global statistics indicate that the prevalence of diabetes would nearly double by the year 2030(13-14). The association between diabetes and thyroid dysfunction is widely known, with the first studies published in 1979.Since then, several studies in different countries were conducted to estimate the prevalence of Thyroid dysfunction in diabetic patients. There is great variability in the prevalence of thyroid dysfunction in general population, ranging from 6.6% to 13.4%.In diabetic patients, the prevalence is still greater and varies from 10-24%.(16)

Thyroid dysfunction is common in diabetic patients and can produce significant metabolic disturbances such as increased hepatic Gluconeogenisis, rapid gastrointestinal glucose absorption and glucose intolerance. (17).Radadiah et al(18) recommendedthat , diabetes mellitus patients should be screened for asymptomatic thyroid dysfunction which is increased in frequency in diabetic population.

In diabetes hypothalamic TRH, pituitary and plasma TSH, as well as TSH secretion rates are reduced ,and the TSH response to TRH is decreased despite normal peripheral TSH metabolism .Stress , which is associated with diabetes ,may also cause changes in the hypothalamic anterior pituitary axis in diabetes(20,21,).The presence of both high and low thyroid hormone levels in diabetes in this study may be due to modified thyroid releasing hormone synthesis and release and may depend on the glycemic status of diabetes. Glycemic status is influenced by insulin, which is known to modulate the levels of TRH and TSH. (22).

In the present study out of the 100 diabetic patients, 8 patients had thyroid dysfunction. The findings of our study are consistent with studies of Papazafiropoulou A, et al (23)(overall prevalence of thyroid disorders was12.3%) Nobre et al (24) overall prevalence of thyroid disorders was12.7% and Radadiedeh et al (overall prevalence of thyroid disorders was12.5%)

In the present study, the prevalence of thyroid disorders was more in females compared to males which when evaluated was statistically significat. Swamy R M et.al, the patients with type 2 diabetes had abnormal thyroid hormone levels .The $T_4$was low and TSH was high in Type 2 Diabetes add this difference was statistically significant.T3 was also low in type 2 diabetes compared to controls (25) which correlates with our findings.

In the present study the prevalence of thyroid dysfunction is increased with age.In the age group >50 years prevalence of hypothyroidism was 5% .Previous studies also shows that thyroid dysfunction increases with age(26,27).

CONCLUSION:

In the present study the serum T3 &T4 was low and TSH was high in Type 2 Diabetes. Prevalence of hypothyroidism is quite high in Type 2 Diabetes. Prevalence is higher in age group >50yrs.Failure to recognize the presence of abnormal thyroid function may be a primary cause of poor management of diabetes mellitus.

Acknowledgements

I am grateful to my parents for rendering their moral support and co-operation during my study and in the preparation of the Original Article. I thank all the staff members of the department and 24 hrs Biochemistry labs, Gandhi Hospital for their co-operation during my study.

Conflict Of Interest: Nil.

Funding: None.

REFERENCES

1. King H, Aubert R E & Herman W H.The Burden of Diabetes in a Developing country. Diab Care.1998; 21 :1414-1431.
2. Zimmet P.Global and societal implications of the diabetes epidemic.J Intern Med.2000 ; 247, 301-310.
3. Tunbridge WM, Evered DC, Hall R, Appleton D, Brewis M, Clark F, Evans JG, Young E, Bird T, Smith PA.T he spectrum of thyroid disease in a community: the Whickham survey. Clin Endocrinol (Oxf). 1977 Dec;7(6):481-93.
4. J. Feely and T. E. Isles, "Screening for thyroid dysfunction in diabetics," British Medical Journal, vol. 1, no. 6179, p. 1678, 1979.
5. R S Gray, W J Irvine, and B F Clarke Screening for thyroid dysfunction in diabetics.Br Med J. 1979 Dec 1; 2(6202): 1439.
6. Srinidhi Rai, Ashok Kumar J, Prajna K, Shobith Kumar Shetty, Tirthal Rai, Shrinidhi, Mohamedi Begum, and Shashikala.Thyroid Function In Type 2 Diabetes Mellitus and in Diabetic NephropathyJ Clin Diagn Res. 2013 Aug; 7(8): 1583–1585.
7. Papazafiropoulou A, Sotiropoulos A, Kokolaki A, Kardara M, Stamataki P, et al. Prevalence of thyroid dysfunction among Greek type 2 diabetic patients attending an outpatient clinic. J Clin Med esearch. 2010;2(2):75–78
8. Singh G, Gupta V, Sharma AK, Gupta N. Frequency of thyroid dysfunction among diabetes in Punjabi population. Adv. Biores. 2011; 2:3–9.
9. J.D. Baxter and P.Webb, "Thyroid hormone mimetics: potential applications in atherosclerosis, obesity and type 2 diabetes,"Nature Reviews Drug Discovery, 2009; 8(4):308–320.
10. de-Greef WJ, Rondeel JM, Van-Haasteren GA, Klootwij KW, Visser TJ. Regulation of TRH production and release in rats. Acta Med Austriaca. 1992; 19:77–79.
11. Vikram B Vikhe1, Shubhangi A Kanitkar1, Krunal K Tamakuwala2, Anu N Gaikwad1, Meenakshi Kalyan3, Rajani R Agarwal "Thyroid dysfunction in patients with type 2 diabetes mellitus at Tertiary care centre..National journal of Med. Research 3(4)Dec 2013.
12. Shah S N Thyroid disease in diabete mellitus. J Assoc physicians of india .2007 32(12):1057-1059.
13. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projection for 2030. Diabetes care 2004; 27: 1047-1053.
14. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Research and Clinical Practice 2010; 87:4-14.
15. Shaw JE, Sicrce RA, Feranini E, Goldene AB, Nathan DM, Schwartz M W, Smith RJ, Smith S. Obesity and type2 diabetes: what can be unified and what needs to be individualized? Diabetes care 2011.34: 1424-1430.
16. Sriram shanmugam ,Suresh damodharan.Prevalence of Thyroid dysfunction in patients with diabetes mellitus.Int J of Res Med Sci . 2015Dec 3(12);3629-3633.
17. Venkateshwarulu Nandyala Gandiah P ET AL, "Thyroid disorders in type 2 diabetes mellitus.Int J of Recent Trends in Science and Technology .2013(2)9.2249-8109.
18. A. R. M. Radaideh, M. K. Nusier, F. L. Amari et al., "Thyroid dysfunction in patients with type 2 diabetes mellitus in Jordan," Saudi Medical Journal, vol. 25, no. 8, pp. 1046–1050, 2004.
19. Shah,S.N. Thyroid disease in diabetes mellitus. J Assoc Physicians India. 2007;32(12):1057- 1059.
20. iugliano D, Paolisso G, Ceriello A: Oxidative stress and diabetic vascular complications. Diabetes Care 19: 257–267, 1996.

21. Pasupathi P, Chandrashekar V, Kumar Senthil U. Evaluation of oxidative stress, antioxidant and thyroid hormone status in patients with diabetes mellitus. J Medicine. 2009;10 :60–66.
22. P. Perros, R. J. McCrimmon, G. Shaw, and B. M. Frier, "Frequency of thyroid dysfunction in diabetic patients: value of annual screening," Diabetic Medicine, vol. 12, no. 7, pp. 622–627, 1995.
23. Papazafiropoulou, A., Sotiropoulos, A., Kokolaki, A. et al.2010. Prevalence of thyroid dysfunction among greek type2 diabetic patients attending an outpatient clinic. J Clinical Medicine Research, 2 (2): 75-8. 5.
24. Swamy RM, Kumar N, Srinivas K, Manjunath GN, Prasad BDS, et al. Evaluation of hypothyroidism as a complication of type 2 diabetes mellitus. Biomedical Research. 2012;23(2):170–72.
25. Nobre,EL, Jorge,Z., Pratas,S.et al.2008.Profile of the thyroid function in a population with type-2 diabetes mellitus. Endocrine Abstracts,3: p298
26. Ramos AJS, da Costa ADM, Benicio AVL: Prevalência de Doença tireoidiana em pacientes com diabetes tipo 1. Arq Bras Endocrinol Metab. 2003, 47 (2): 177-182.
27. Péres DS, Dos Santos MA, Zanetti ML, Ferronato AA: Dificuldades dos pacientes diabéticos para o controle da doença:sentimentos e comportamentos. Rev Latino Am Enfermagem. 2007, 15 (6): 1105-1112.