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Biochemistry

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

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ABSTRACT **Introduction:** Thyroid diseases and diabetes mellitus are the two most common endocrine disorders encountered in clinical practice. Thyroid disorders can have a major impact on glucose control, and untreated thyroid disorders affect the management of diabetes in patients. The present study aimed to study thyroid dysfunction with type 2 diabetes mellitus. **Aim:** The aim of the present study was to evaluate thyroid dysfunction in type 2 diabetes in south Indian subjects. **Materials and methods:** A total of 50 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:** The mean and S.D of serum Fasting plasma Glucose in controls is 94.16± 8.87as compared to 158 ± 50.13 in cases. The mean and S.D of serum TSH in controls is 1.95 ± 0.78 as compared to 23.83 ± 1250.595 in cases. The mean and S.D of serum T3 in controls is 1.22 ± 0.38 as compared to 0.53 ± 0.47 in cases. The mean and S.D of serum T4 in controls is95.25 ± 19.38 as compared to 48.47 ± 21.75 in cases. **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 increases 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 disorders 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 thyroid dysfunction in type 2 Diabetes Mellitus in South Indian Subjects.

Materials and methods

Subjects

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

Design

The total number of subjects included in the study was 50 and divided into two groups. Group I consists of 25 normal healthy subjects as controls while Group-II consists of patients with Diabetes as cases. This is a case control study.

Criteria for Selection

Inclusion criteria

1. All diabetic subjects aged 20-70 years

Exclusion criteria.

1. Previous history of thyroid disease co-existing
2. Hepatobiliary disease
3. Pregnancy
4. Systemic drug therapy such as thyroxin, antithyroid drugs, glucocorticoids, oral contraceptives

Blood Sample Collection

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 fully automated analyzer (DS-302 vector Biotech); Glucose was estimated by "GOD-PAP", enzymatic photometric test methodology.

Ethics approval

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

RESULTS

The total number of subjects included in the study was 50 and divided into two groups. Group I consists of 25 normal healthy subjects as controls while Group-II consists patients with Diabetes mellitus as cases. The mean and S.D of serum Fasting Blood Glucose in controls is 94.16± 8.87as compared to 158 ± 50.13 in cases. The mean and S.D of serum TSH in controls is 1.95 ± 0.78 as compared to 23.83 ± 1250.595 in cases. The mean and S.D of serum T_3 in controls is 1.22 ± 0.38 as compared to 0.53 ± 0.47 in cases. The mean and S.D of serum T_4 in controls is95.25 ± 19.38 as compared to 48.47 ± 21.75 in cases. (TABLE-1, Fig 1&2).

Table 1: Comparisons of FBS, T3, T4, TSH in Case and Control Group

Parameters	Control	Cases	P-Value
FBS	94.16 ± 8.87	158 ± 50.13	0.000000107
T3	1.22 ± 0.38	0.53 ± 0.47	0.01

T4	95.25 ± 19.38	48.47 ± 21.75	0.0001*
TSH	1.95 ± 0.78	23.83 ± 1250.595	0.002

Figure 1: Comparisons of FBS, T3, T4, TSH in Case and Control Group

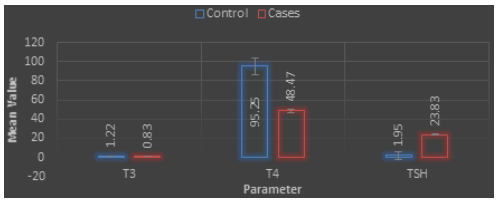
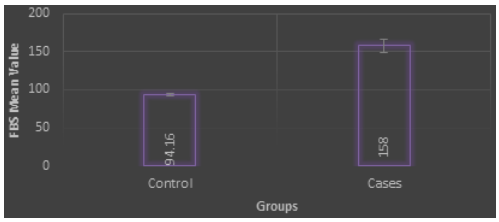


Figure 2: Comparisons of FBS in Cases and Control Group



The mean Age group in cases 39.76 ± 9.39 as compared to 34.36 ± 12.06 in controls(Table-2). The levels of serum TSH and Fasting Blood Sugar were significantly increased while serum T3, and T4 levels were significantly decreased in cases compared to controls.

Table 2: Age wise and Sex wise distribution

Group	Male	Female	Mean Age ±SD
Control	6	24	34.36 ± 12.06
Cases	2	28	39.76 ± 9.39

DISCUSSION:

Global statistics indicate that the prevalence of diabetes would nearly double by the year 2030(13-14). The prevalence of Type-2 diabetes in India is highest among various Asian populations. Number of deaths in adults due to diabetes among all age groups is 6.8% at global level.(15). 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) recommended that,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(19,20,).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 statatus of diabetes.Glycemic status is influenced by insulin, which is known to modulate the levels of TRH and TSH. (21).

According to Swamy R M et.al, Jhansi C et.al (22) 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 (23) which correlates with our findings.

CONCLUSION:

In the present study the serum T3 &T4 was low and TSH was high in Type 2 Diabetes.Failure to recognize the presence of abnormal thyroid function may be a primary cause of poor management of diabetes mellitus.

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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. iugliano D, Paolisso G, Ceriello A: Oxidative stress and diabetic vascular complications. Diabetes Care 19: 257–267, 1996.
20. 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.
21. 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.
22. Jhansi Rani C, Sarojini C Prevalence of Thyroid Dysfunction in Type 2 Diabetes Mellitus in South Indian Subjects.Int J Scien Research : Volume-9 | Issue-8 | August-2020
23. 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.