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Original Research

A case control study to evaluate the prevalence of thyroid dysfunction in Type‑2 Diabetes Mellitus

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ABSTRACT
Aim: Present study was done to evaluate the prevalence of thyroid dysfunction in Type 2 Diabetes Mellitus and the spectrum of thyroid dysfunction. **Material and methods**: This case control study was conducted in Family Medicine outpatient clinics in Lucknow. A total of 100 cases diagnosed with Type-2 Diabetes Mellitus and 100 healthy controls were taken randomly. Thyroid function tests were conducted using the chemiluminescence assay. **Statistical Analysis:** The data was tabulated and Statistical analysis was performed using the Chi-square test for categorical variables. Student's t-test was used for finding significance between the means. P value ≤ 0.05" was considered statistically significant. **Results:** 26 patients had thyroid dysfunction which was found to be significantly more in type 2 DM than in healthy controls. Among those diabetic patients with thyroid dysfunction, 17 were females. The mean body mass index was high in diabetic patients with thyroid dysfunction. The hemoglobin A1c levels in patients who had thyroid dysfunction were high. Those with thyroid dysfunction had a mean total cholesterol level higher than euthyroid diabetics and controls. Goiter was found to be present in 3 of cases of Type 2 DM. **Conclusion:** Type 2 DM and thyroid diseases have a significant association. Subclinical hypothyroidism and overt hypothyroidism were the most common thyroid abnormality in Type 2 DM. Thyroid dysfunction was associated with worsening dyslipidemia in Type 2 DM.

Key words: Subclinical Hypothyroidism, Thyroid Dysfunction, Type 2 Diabetes Mellitus

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INTRODUCTION:

Type 2 diabetes and hypothyroidism are interminable ailments which habitually require long lasting follow up and treatment. Both diseases have enduring impacts on cardiovascular health and mortality with a higher hazard owing to the former.[1,2] Also being a direct cardiovascular risk factor hypothyroidism adds to cardiovascular morbidity by encouraging other risk factors like hyperlipidemia and hypertension.[3] Subclinical hypothyroidism of moderate severity is associated related with increased risk of heart failure and stroke in the youths. Hypothyroidism has likewise been related with nonalcoholic fatty liver disease, cancer mortality, arthritis, and kidney dysfunction yet the causality in these circumstances is questionable.[4] A recent meta-analysis of 61 studies by C. Han et al[5] has shown a higher pervasiveness of subclinical hypothyroidism in patients with type 2 diabetes mellitus and higher occurrence of microvascular complications in the patients having both the conditions.[5] Both type 2 diabetes and hypothyroidism can be overseen well in practically all patients to result in normal blood glucose levels and thyroid hormone levels which may decrease the morbidity of these conditions.[6] India is the diabetes capital of the world with the disease evaluated to influence 6.5 to 19.5% of the grown - up Indians.[7] The connection among diabetes and thyroid dysfunction has been considered by different scientists and the predominance of hypothyroidism among patients with diabetes is accounted for from 4.8 to 31.4%.[8] Predominance of hypothyroidism in India is around 11%.[9] There is scarcity of huge examinations from India which have investigated the pervasiveness of thyroid disorders in patients with diabetes mellitus. Through this retrospective investigation of diabetic outpatients visiting a TS Misra Medical College & Hospital Lucknow, we

evaluated the pervasiveness of essential hypothyroidism and its relationship with other clinical parameters.

SUBJECTS AND METHODS

This was a case control study undertaken in various TS Misra Medical college & hospital Lucknow during the period from March 2016 to March 2019. This study included 100 diagnosed cases of Type-2 DM and 100 age and sex matched healthy controls. Type 2 diabetes mellitus (Type 2 DM) cases with age >35 years, who were on oral hypoglycemic agents for at least 6 months, were included in the study. The diagnosis of type 2 DM was based on the American Diabetes Association criteria. The known patients with thyroid disease and patients having coexistent conditions that can influence the thyroid hormone levels history of neck irradiation, pregnancy, fever, burns, trauma, liver cirrhosis, renal failure, malignancies, myocardial infarction and drugs such as oral contraceptive pills (OCP), salicylates, phenytoin, amiodarone and beta blockers were excluded. Patients were diagnosed to have:

1. Overt hypothyroidism: When TSH >5.5 µl U/ml, free T4 <0.8 ng/dl and/or free T3 <1.4 pg/ml.
2. Overt hyperthyroidism: When TSH <0.5 µl U/ml, free T4 >1.5 ng/dl and/or free T3 >4.2 pg/ml.
3. Subclinical hypothyroidism: When TSH >5.5 µl U/ml with normal free T3 and free T4
4. Subclinical hyperthyroidism, when TSH <0.5 µl U/ml with normal free T3 and free T4.

RESULTS:

Table 1: Thyroid dysfunction in type 2 diabetes mellitus and controls

Thyroid dysfunction	Type 2 DM	Control
Subclinical hypothyroidism	16	3
Hypothyroidism	10	2
Subclinical hyperthyroidism	0	0
Hyperthyroidism	0	0
Total	26	5

Table 2: Age distribution of thyroid dysfunction in diabetics

Age group in years	Hypothyroidism [In Type 2 DM]	Subclinical hypothyroidism [In Type 2 DM]	Hypothyroidism [In Control]	Subclinical hypothyroidism [In Control]
35-45	1	3	0	0
45-55	2	7	0	3
55- 65	7	6	3	2

Table 3: Comparison of body mass index, thyroid stimulating hormone levels, Mean hemoglobin A1c levels, Lipid profile variations, Triglyceride level, Low density lipoprotein cholesterol distribution and Prevalence of thyroid swelling among cases and controls

	Diabetes +thyroid dysfunction	Euthyroid diabetics	Healthy controls
Body mass index	30.12 ± 2.12 kg/m^2	24.89 ± 1.11 kg/m^2	19.12 ± 2.08 kg/m^2
Thyroid stimulating hormone levels	13.12 ± 1.98	3.1± 2.1	1.98± 2.1
Mean hemoglobin A1c levels	11.10 ± 2.11	7.02± 2.19	4.1 ± 0.98
Lipid profile variations	265 ±11.12 mg/dl	196.23 ± 8.12 mg/dl	185 ± 7.67 mg/dl.
Triglyceride level	212.23 ± 10.12 mg/dl	150.12 ± 9.12 mg/dl	135.87 ± 10.11 mg/dl
Low density lipoprotein distribution	165.98 ± 9.12 mg/dl	98.83 ± 10.11 mg/dl	89 ± 9.56 mg/dl
Prevalence of thyroid swelling	3	0	0

DISCUSSION:

Diabetes is the most common endocrine metabolic disorder, we were curious to understand and learn the association of this with another common endocrine gland function, i.e., the thyroid gland. The presence of insulitis, presence of antibodies and auto reactive T cell's against islet antigens and an association with thyroid disorders suggests that Type 1 DM is an autoimmune disorder.[10]

In present study, among 100 diabetic patients 26 were found to have thyroid dysfunction. Amongst 26 cases, 16 had subclinical hypothyroidism and 10 had overt hypothyroidism. In the healthy control group, 2 individuals had thyroid dysfunction of which one with subclinical hypothyroidism and other with overt hypothyroidism. The association of Type 2 DM and thyroid disease was significant. This is in accordance with the study done by Akbar et al. In 2005, Akbar et al. reported an overall prevalence of 16% cases of thyroid dysfunction and 42% in cases of latent autoimmune diabetes in adults (LADA).[11] The most common thyroid abnormality detected was subclinical hypothyroidism followed by overt hypothyroidism. In 2002, Nobre et al[12] reported 298 cases of Type-2 DM with an overall prevalence of thyroid dysfunction in 12.7%. Of these, subclinical hypothyroidism was found in 68%. About 2% of the cases of hyperthyroidism were also detected. However, we could not find any cases of hyperthyroidism, subclinical or overt, detected in the present sample of the diabetic population studied. This could be related mainly to the smaller sample size taken and partly to the old age group of the sample studied, as there is an increased prevalence of thyroid hypofunction than hyperfunction as age advances. Krejci H and Perusicova J stated that recently, there is an increase in reports which confirm a higher incidence of autoimmune thyroid diseases even in Type 2 DM.[13] Moreover, the percentage of thyroid profile abnormality detected in the general population was 5% which is lower with the data of Whickham survey by Tunbridge et al[14] they found it to be 6.6%. The difference can be due to many factors like the smaller sample size, difference in the sensitivity of estimation method, and variability in the prevalence of autoimmune factors in different populations. The study done by Smithson MJ[15] in a larger population of 206 cases of Type 2 DM also showed a higher female ratio with the prevalence in female diabetics as 10.9% and males as 6.9%, whereas, in this study, that was 17 were females and 9 were males respectively. A possible confounding factor could be an increase in female samples, but not amounting to this high a difference which definitely shows a higher prevalence in thyroid disease in females.

The mean body mass index in diabetic patients was 30.12 ± 2.12 kg/m^2, which was higher than that amongst controls (24.89 ± 1.11kg/m2) and euthyroid diabetics (19.12 ± 2.08 kg/m2). This observation attained significance like the study by Kenigsberg S.[16] who reports a large number of obese patients in diabetes, possibly due to obesity associated insulin resistance.

The mean HbAlc level in people with diabetes with thyroid dysfunction was (11.10 ± 2.11) higher than those of euthyroid ones (7.02± 2.19). The study by Schlienger JL et al[17] shows a poor glycemic control inducing a "low T3 state" in patients with both Type 1 and Type 2 DM. However, it should be emphasized that a low T3 syndrome may occur in diseases characterized by increased catabolism. The lipid level variations in our study are in accordance with the Fremantle diabetic study by Davis TM et al.[18]

CONCLUSION

From above study it can be concluded that Type 2 DM and thyroid diseases have a significant association. Subclinical hypothyroidism and hypothyroidism (overt) were the most common thyroid abnormality in Type 2 DM. Thyroid dysfunction was more prevalent in female diabetic patients than in males. Thyroid dysfunction was associated with worsening dyslipidemia in Type 2 DM.

REFERENCES:

1. Bertoni G, Krop JS, Anderson GF and Brancati FL, "Diabetes-related morbidity and mortality in a national sample of U.S. elders," Diabetes Care, vol. 25, no. 3, pp. 471 475, 2002.
2. Laulund AS, Nybo M, Brix TH, Abrahamsen B, Jorgensen HL, and Heged L, "Duration of thyroid dysfunction correlates with all-cause mortality. The OPENTHYRO register cohort," PLoS ONE, vol. 9, no. 10, 2014.
3. Dorr M and Volzke H. Cardiovascular morbidity and mortality in thyroid dysfunction. Minerva Endocrinologica. 2005;30(4):199–216.
4. Chaker L, Bianco AC, Jonklaas J, and Peeters RP, "Hypothyroidism," The Lancet. 2017; 390(10101:1550–62.
5. Han C, He X, Xia X et al. "Subclinical hypothyroidism and type 2 diabetes: a systematic review and meta-analysis," PLoS ONE. 2015;10(8), Article IDe0135233.
6. Gale EAM, "The United Kingdom Prospective Diabetes Study [UKPDS], Diapedia 1104085197 rev. no. 20," https://doi .org/10.14496/dia.1104085197.20, 2014.
7. Tandon N and Raizada N, "The burden of diabetes in India [internet], 1105045828 rev. no. 8," https://doi.org/10.14496/dia.1105045828.8, 2014.
8. Wang C, "The relationship between type 2 diabetesmellitus and related thyroid diseases," Journal of Diabetes Research. 2013;2013, Article ID 390534, 9 pages.
9. Bagcchi S. "Hypothyroidism in India: More to be done," The Lancet Diabetes & Endocrinology. 2014; 2(10):778.
10. Jalal MJ, Riyas B, Kumar AP. Thyroid dysfunction in patients with Type-2 diabetes mellitus in Kerala: A case–control study. Thyroid Res Pract 2019;16:3-5.
11. Akbar DH, Ahmed MM, Al-Mughales J. Thyroid dysfunction and thyroid autoimmunity in Saudi type 2 diabetics. Acta Diabetol 2006;43:14-8.
12. Nobre EL, Jorge Z, Prates S, Silva C, Castro JJ. Profile of thyroid function in a population with type-2 diabetes mellitus. Br Endocr Soc Abstract 2000;3:298.
13. Krejci H, Perusicova J. Autoimmune thyropathies in patients with diabetes mellitus type 1 and 2. DMEV 2004;7:164.
14. Tunbridge WM, Evered DC, Hall R, Appleton D, Brewis M, Clark F et al. The spectrum of thyroid disease in a community: The Whickham Survey. Clin Endocrinol (Oxf) 1977;7:481-93.
15. Smithson MJ. Screening for thyroid dysfunction in a community population of diabetic patients. Diabet Med 1998;15:148-50.
16. Kenigsberg S. Pharmalogical approaches to treating obese patient. Clin Endocrinol Metab 1976;5:455-79.
17. Schlienger JL, Anceau A, Chabrier G, North ML, Stephan F. Effect of diabetic control on the level of circulating thyroid hormones. Diabetologia 1982;22:486-8.
18. Davis TM, Bruce DG, Davis WA. Predictors of first stroke in type 1 diabetes: The Fremantle diabetes study. Diabet Med 2005;22:551-3.