

Study of Pattern of Thyroid Dysfunction in Patients with Type 2 Diabetes Mellitus in a Rural Hospital in Karnataka

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Abstract

Background and Objectives: Thyroid dysfunction is known to occur in patients with Type 1 DM, It is due to autoimmunity. The prevalence of thyroid dysfunction in patients with Type 2 DM varies between 10% - 31%. Subclinical hypothyroidism and overt hypothyroidism is the pattern commonly observed. Altered thyroid functions is associated with deranged fat metabolism. The deleterious effects on lipid profile in turn leads to adverse cardiovascular and cerebrovascular events.

Hence this study aims at studying the prevalence and pattern of thyroid dysfunction in patients with Type 2 DM.

Materials and Methods: This is a prospective case control study conducted in Adichunchanagiri Institute of Medical Sciences, B.G. Nagar, Nagamangala Taluk. It is situated in a rural place and predominantly serves a large village population. Out of 108 patients studied 54 were cases and 54 controls. Patients with pre existing thyroid dysfunction or on medications that alter thyroid dysfunction, pre existing liver / renal disease, pregnant women were excluded from study. Informed consent was taken. Detail history and physical examination were done.

FBS, PPBS, HbA_{1c}, Serum Creatinine, Fasting Lipid Profile and Thyroid Profile were done. fT₄ if required.

Results: There were 21 (38.8%) males and 33 (61.2%) females in cases and 15 (27.7%) males and 39 (72.3%) females in controls. In cases 19 (35.2%) patients had thyroid dysfunction. 13 (24.1%) had subclinical hypothyroidism and 6 (11.1%) had overt hypothyroidism. 4 (7.5%) people in control group had thyroid dysfunction.

Conclusion: Our study shows that the prevalence of thyroid dysfunction is more in patients with type 2 DM as compared to normal population.

Key words: Thyroid Dysfunction, Type 2 Diabetes Mellitus

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I. Introduction

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia, caused either by absolute or relative deficiency of insulin. Lack of insulin affects the metabolism of carbohydrate, protein and fat, and can cause significant disturbance of water and electrolyte homeostasis; death may result from acute metabolic decompensation. The thyroid gland produces two related hormones, thyroxine (T₄) and triiodothyronine (T₃), which play a critical role in cell differentiation during development and help maintain thermogenic and metabolic homeostasis in the adult. Thyroid dysfunction is very well known in Type 1 Diabetes Mellitus where it is due to autoimmune process. Recently few studies have shown that Thyroid dysfunction especially hypothyroidism is found in patients with Type 2 Diabetes Mellitus but the mechanism for this is largely unknown. Diabetic patients have a higher prevalence of thyroid disorders compared with the normal population and the most common amongst them is SCH. The prevalence of thyroid dysfunction in type 2 DM patients is as high as 31.4%. Hyperthyroidism is typically associated with worsening glycemic control and increased insulin requirements. In hypothyroid patients there will be reduced rate of insulin degradation which may lower the exogenous insulin requirement. But more importantly hypothyroidism is accompanied by a variety of abnormalities in plasma lipid metabolism, including elevated triglyceride and LDL cholesterol concentrations. Even subclinical hypothyroidism can exacerbate the coexisting dyslipidemia commonly found in type 2 diabetes and further increase the risk of cardiovascular diseases. Subclinical hyperthyroidism may increase the risk of cardiac arrhythmias and exacerbate angina.

Identification of associated Thyroid dysfunction and early intervention may significantly reduce the risk of adverse cardiovascular and cerebrovascular events.^{3,5}Hence this study aims to know the prevalence of thyroid dysfunction among Type 2 diabetic patients.

II. Materials And Methods :

It is a case control study conducted in Adichunchanagiri Institute of Medical Sciences, B .G .Nagar, Nagamangala Taluk. Patients with type 2 DM either newly diagnosed or on treatment were included in the study. Patients with Infections , trauma, Pregnant women, Patients with preexisting liver disease, Patients on medication that alter thyroid functioning, diabetic Patients with previously known Thyroid dysfunction were excluded from the study.

Sample size was 108 with 54 cases and 54 controls. FBS, PPBS, HbA_{1c}, Serum Creatinine, Fasting Lipid Profile and Thyroid Profile were done. FT4 if required was estimated.

Statistical analysis

Statistical analysis was done by using SPSS 17.0 software. The data collected was summarized by computing the descriptive statistics like mean, standard deviation, standard error of mean, median for all the quantitative variables such as Age, Duration of DM, TSH levels, HbA_{1c}, BMI etc. and percentages for all the qualitative variables like Hypertension, dyslipidemia etc. The difference between different parameters based on quantitative variables was compared using Student's t test, ANOVA, Mann Whitney test for independent samples and the chi-square for comparison of difference in proportions. The difference was considered statistically significant when the p value < 0.05 .

III. Results:

Out of 108 patients studied 54 were cases and 54 controls. There were 21(38.8%) males and 33 (61.2%) females in cases and 15 (27.7%) males and 39 (72.3%) females in control group. Most of the cases and controls were in age group of 41 - 60 yrs. 48(88.8%) of cases had FBS > 126 and 47(87%) had a PPBS > 200. 46(85.2%) of cases had a SBP >130 and 38(70.4%) had a DBP >90. 49(90.7%) of cases had triglycerides level >150 and 48(88.9%) had HDL<40. There were 21 (38.8%) males and 33 (61.2%) females in cases and 15 (27.7%) males and 39 (72.3%) females in controls. In cases 19 (35.2%) patients had thyroid dysfunction. 13 (24.1%) had subclinical hypothyroidism and 6 (11.1%) had overt hypothyroidism. 4 (7.5%) people in control group had thyroid dysfunction.

IV. Discussion:

Diabetic patients have a higher prevalence of thyroid disorders compared with the normal population.1 A number of reports have also indicated a higher than normal prevalence of thyroid disorders in type 2 diabetic patients, with hypothyroidism especially subclinical being the most common disorder.^{3,4,6} Celani MF et al., studied 290 type 2 diabetics, 159 females and 131 males aged 40 to 93 years. Among them abnormal TSH concentrations were detected in 91 patients (31.4%). Subclinical hypothyroidism was most common (48.3%), followed by subclinical hyperthyroidism (24.2%) and by definite hypothyroidism (23.1%). Definite hyperthyroidism was found in 4 patients (4.4%). They found that prevalence of abnormal thyroid function test results was significantly higher in the female than in the male patients and in the insulin-treated patients than in those receiving oral hypoglycaemic agents. They also found that 30 patients with abnormal thyroid function test results (33.0%) had evidence of thyroid autoimmunity.⁴ In a study conducted by Papazafiropoulou et al., they found that out of 1,092 greek type 2 diabetic patients, the prevalence rate of thyroid dysfunction was 12.3%. In the group with thyroid dysfunction there was an excess of females in comparison with the group without thyroid dysfunction (P < 0.001).⁷ Demitrost L et al., did a retrospective study and found that out of 202 type 2 DM patients 139 (68.8%) were euthyroid, 33 (16.3%) had subclinical hypothyroidism , 23 (11.4%) have hypothyroidism, 4 (2%) had subclinical hyperthyroidism and 3 (1.5%) were overt hyperthyroid. Maximum cases were of hypothyroidism (subclinical and clinical) seen in the age group of 45-64 years. They also found that patients with BMI > 25 were at increased risk of having hypothyroidism (P < 0.016).⁸ Perros P et al., randomly selected 1310 adult diabetic patients attending a diabetic outpatient clinic and subjected them to thyroid function test. They found that the overall prevalence of thyroid disease was 13.4%, and was highest (31.4%) in Type 1 diabetic females, and lowest in Type 2 diabetic males (6.9%). As a direct result of screening, new thyroid disease was diagnosed in 6.8% (89 patients) of the population screened; the commonest diagnosis was subclinical hypothyroidism (4.8%), followed by hypothyroidism (0.9%), hyperthyroidism (0.5%), and subclinical hyperthyroidism (0.5%). The study concluded that thyroid function should be screened annually in diabetic patients to detect asymptomatic thyroid dysfunction which is increased in frequency in a diabetic population.⁹ Chubb SA et al., studied 420 adult females with type 2 diabetes randomly selected from participants in the community-based Fremantle Diabetes Study and found that the prevalence of subclinical

hypothyroidism was 8.6%.10 Melville NA et al., did a cross-sectional study comparing 1,848 adult patients with type 2 diabetes and 3,313 individuals without diabetes, and showed the prevalence of hypothyroidism on the study group to be 5.7% compared with 1.8% in the control group ($P \leq 0.001$). They concluded that Patients with type 2 diabetes should be evaluated for thyroid dysfunction as are those with type 1 diabetes.11

Conflict of Interest : None

Ethical Clearance : Obtained

Source of Funding : Self

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