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CORRELATION OF SUBCLINICAL HYPOTHYROIDISM WITH TYPE 2 DIABETES MELLITUS IN PATIENTS: A STUDY CONDUCTED AT A TERTIARY CARE CENTER IN RURAL UTTAR PRADESH

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Abstract:
Subclinical hypothyroidism (SCH) is increasingly recognized as a potential metabolic disturbance in individuals with type 2 diabetes mellitus (T2DM). Given the high prevalence of T2DM and thyroid dysfunctions in rural areas, particularly in underserved populations, this study investigates the correlation between SCH and T2DM. Conducted in Uttarpradesh university of medical science (UPUMS) a tertiary care center in rural Uttar Pradesh, this cross-sectional study aimed to explore the incidence of SCH in T2DM patients and its possible metabolic impact. Our findings reveal a significant correlation between SCH and T2DM, suggesting that early detection and management of thyroid abnormalities may improve metabolic control in diabetic patients.

Keywords:* Subclinical hypothyroidism, Type 2 diabetes mellitus, Thyroid dysfunction, Tertiary care, Rural healthcare, Uttar Pradesh

Introduction:

Diabetes mellitus, especially type 2 (T2DM), is a major global health problem, contributing to increased morbidity and mortality due to its complications. Thyroid dysfunction, particularly subclinical hypothyroidism (SCH), is frequently seen in diabetic populations. SCH is defined as an elevated serum thyroid-stimulating hormone (TSH) level with normal free thyroxine (T4) levels. Although SCH is often asymptomatic, its effects on glucose metabolism and insulin sensitivity are notable. Both SCH and T2DM are prevalent in India, with an even higher burden in rural areas where access to healthcare is limited. Despite this, the association between these two conditions remains underexplored, especially in rural populations.

This study aims to assess the prevalence of SCH among T2DM patients in Uttarpradesh university of medical sciences (UPUMS) Saifai, Etawah a tertiary care center in rural Uttar Pradesh and examine whether SCH contributes to worsened glycemic control or other metabolic disturbances in these patients.

Materials and Methods:

Study Design:

This was a cross-sectional observational study conducted over a period of six months from Jan 2023 to June 2023 at UPUMS Saifai, Etawah a tertiary care hospital in rural Uttar Pradesh.

Study Population:

The study included 250 patients diagnosed with T2DM, aged between 35 and 70 years, who visited the outpatient department (OPD) for routine diabetes management. Exclusion criteria were patients already diagnosed with overt thyroid disease, on thyroid medication, or with a history of thyroidectomy.

Sample Collection:

Blood samples were collected after an overnight fast for the assessment of thyroid function tests (TSH, free T4) and glycemic parameters (fasting blood glucose, HbA1c). SCH was diagnosed based on elevated TSH (>4.5 mIU/L) with normal free T4 levels (0.7–1.9 ng/dL). Other metabolic parameters such as lipid profiles were also measured.

Statistical Analysis:

The data were analyzed using SPSS software version 24.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as percentages. The Pearson correlation coefficient was used to assess the correlation between TSH levels and glycemic parameters. A p-value of <0.05 was considered statistically significant.

Results:

Demographics:

Of the 250 T2DM patients, 144 were male (57.6%) and 106 were female (42.4%). The mean age of the study participants was 56.3 ± 8.7 years. The mean duration of diabetes was 8.4 ± 5.1 years.

Prevalence of SCH:

Among the study participants, 68 patients (27.2%) were diagnosed with SCH. There was a slightly higher prevalence of SCH in females (32%) compared to males (23.6%).

Glycemic Control in SCH Patients:

Patients with SCH had significantly higher fasting blood glucose levels (mean: 152.6 ± 27.8 mg/dL) and HbA1c levels (mean: 8.7% ± 1.4%) compared to T2DM patients without SCH (fasting glucose: 136.4 ± 22.9 mg/dL, HbA1c: 7.8% ± 1.2%) ($p < 0.01$).

Lipid Profile and Other Metabolic Parameters:

SCH patients also showed a statistically significant increase in total cholesterol, triglycerides, and low-density lipoprotein (LDL) levels compared to non-SCH patients. High-density lipoprotein (HDL) levels were lower in the SCH group, though not significantly.

Correlation Analysis:

A positive correlation was found between TSH levels and fasting blood glucose ($r = 0.48$, $p < 0.001$) as well as HbA1c levels ($r = 0.51$, $p < 0.001$), indicating that patients with higher TSH levels had poorer glycemic control. There was also a weak but significant correlation between TSH levels and triglyceride levels ($r = 0.27$, $p < 0.05$).

Discussion:

This study highlights the strong association between SCH and T2DM in a rural population of Uttar Pradesh. Our findings are consistent with previous studies, which have reported higher rates of thyroid

dysfunction in diabetic patients. The observed prevalence of SCH in this study (27.2%) is notably higher than in the general population, further emphasizing the importance of screening for thyroid disorders in diabetic patients.

The mechanisms underlying the association between SCH and T2DM are not fully understood. However, it is hypothesized that hypothyroidism, even in its subclinical form, may contribute to insulin resistance, dyslipidemia, and altered glucose metabolism. This is supported by our observation of higher fasting glucose and HbA1c levels in SCH patients. Moreover, the significant correlation between elevated TSH levels and poor glycemic control suggests that undiagnosed SCH may worsen diabetes management outcomes.

Given the metabolic complications associated with both T2DM and SCH, early identification and management of thyroid dysfunction could have important clinical implications. Screening for SCH, particularly in rural areas with limited healthcare resources, could improve overall disease management and reduce the risk of diabetes-related complications.

Conclusion:

The findings of this study demonstrate a significant correlation between subclinical hypothyroidism and poor glycemic control in patients with type 2 diabetes mellitus. Given the high prevalence of both conditions in rural populations, routine screening for thyroid dysfunction should be considered in the management of T2DM. Addressing thyroid abnormalities early may help improve metabolic outcomes and reduce complications associated with diabetes.

Recommendations:

1. Routine thyroid function testing for all T2DM patients, especially in rural areas.
2. Further research into the benefits of thyroid hormone replacement therapy in patients with SCH and T2DM.
3. Public health initiatives to raise awareness of thyroid disorders in diabetic populations in underserved areas.

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