

A Comparative Study to Assess the Association of Hypothyroidism with Diabetes: An Institutional Based Study

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ABSTRACT

Background: Diabetes mellitus not infrequently coexists with hypo- and hyperthyroidism. Hyperthyroidism aggravates glucose intolerance. Hence; the present study was planned for assessing the association of association of hypothyroidism with diabetes.

Materials & Methods: A total of 100 diabetic patients who reported to the Department of General Medicine, Government Medical College, Haldwani, Nainital, Uttarakhand, (India) were included in the present study. Complete clinical profile of all the patients was obtained. Another set of 100 non-diabetic patients reporting to the department of general medicine for routine medical check-up were also included as controls. Thyroid profile included assessment of serum protein bound iodine, serum thyroxine (T4), serum triodo-thyronine (T3) free thyroxine index, serum thyrotrophin (TSH), thyrotrophin releasing hormone (TRH) testing. Correlation of occurrence of hypothyroidism in diabetic patients was assessed.

Results: Among the diabetic patients, the prevalence of hypothyroidism was 26 percent while among the controls; the prevalence of hypothyroidism was 12 percent. Significant results were obtained while comparing the prevalence of hypothyroidism among diabetic patients and controls. While studying the age wise and gender wise distribution of diabetic patients with hypothyroidism, non - significant results were

obtained. In the present study, while studying the gender wise distribution of diabetic patients with hypothyroidism, non-significant results were obtained. 53.84 percent of the patients were males while the remaining 46.16 percent of the patients were females.

Conclusion: Diabetic patients are significantly affected with hypothyroidism.

Key words: Diabetes, Hypothyroidism.


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INTRODUCTION

Diabetes mellitus not infrequently coexists with hypo- and hyperthyroidism. Hyperthyroidism aggravates glucose intolerance. A review of this phenomenon reveals multiple mechanisms, which include increased hexose intestinal absorption, decreased responsiveness to insulin, and increased glucose production.^{1,2} Type 2 diabetes mellitus (DM) is a growing problem in our country and we have observed that many patients are associated with thyroid dysfunction later in their life. Association of poorly controlled diabetes and thyroid results in a low T3 state and loss of TSH response to TRH. Regardless of glycemic control there is an absence of nocturnal THS peak. However, literature has paucity of data in relation to prevalence of thyroid dysfunction in these patients.^{3,4}

Hence; under the light of above mentioned data, the present study was planned for assessing the association of association of hypothyroidism with diabetes.

MATERIALS & METHODS

The present study was planned in the Department of General Medicine, Government Medical College, Haldwani, Nainital, Uttarakhand, (India) and it included assessment of association of association of hypothyroidism with diabetes. Ethical approval was obtained from ethical committee of the institution and written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 100 diabetic patients who reported to the department of internal medicine were included in the present study. Another set of 100 non-diabetic patients reporting to the department of general medicine for routine medical check-up were also included as controls. Complete clinical profile of all the patients was obtained. Blood samples were obtained from all the patients and were sent to the central laboratory for the analysis of thyroid hormones. Thyroid profile included assessment of serum protein bound iodine, serum

thyroxine (T4), serum triiodo-thyronine (T3) free thyroxine index, serum thyrotrophin (TSH), thyrotrophin releasing hormone (TRH) testing. Correlation of occurrence of hypothyroidism in diabetic

patients was assessed. All the data were compiled and were analyzed by SPSS software. Chi- square test was used for assessment of level of significance.

Table 1: Prevalence of hypothyroidism

Parameter	Diabetic group (out of 100)	Controls (out of 100)	p- value
Number of patients with hypothyroidism	26	12	0.00 (Significant)

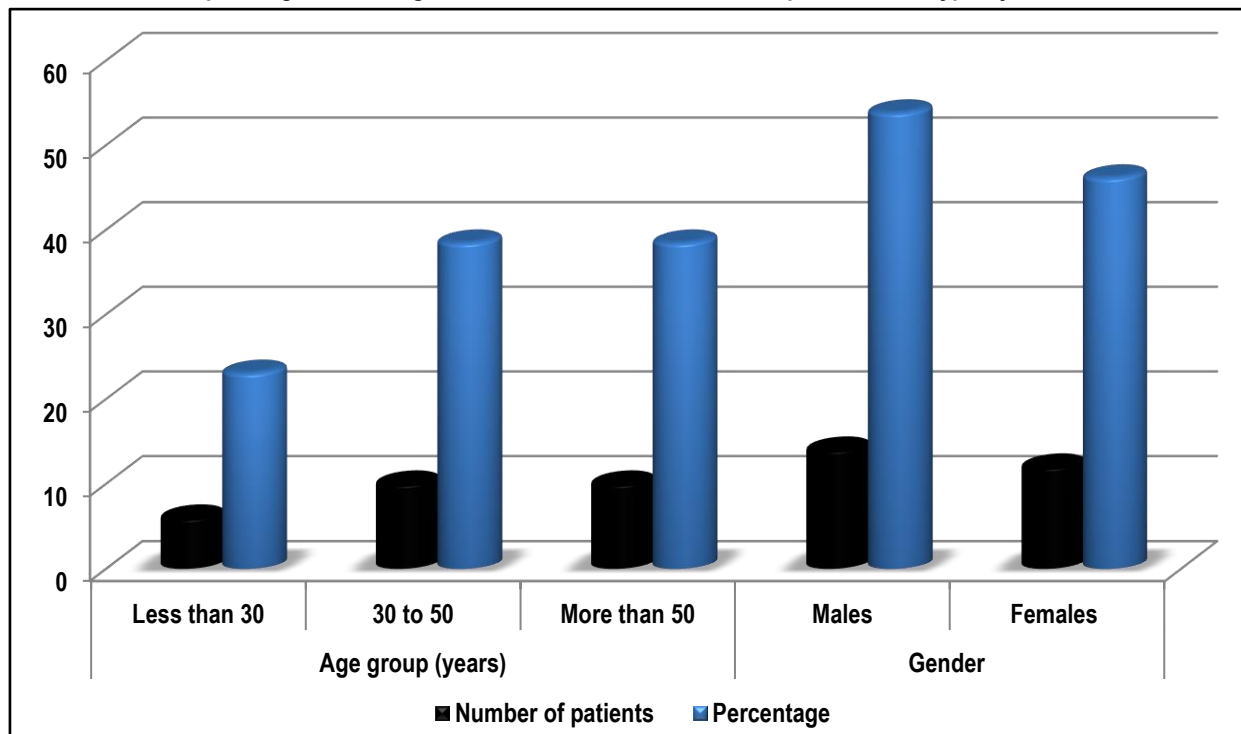
Table 2: Age-wise distribution of diabetic patients with hypothyroidism

Age group (years)	Number of patients	Percentage	p- value
Less than 30	6	23.08	0.26 (Non- Significant)
30 to 50	10	38.46	
More than 50	10	38.46	
Total	26	100	

Table 3: Gender -wise distribution of diabetic patients with hypothyroidism

Gender	Number of patients	Percentage	p- value
Males	14	53.84	0.45 (Non- Significant)
Females	12	46.16	
Total	26	100	

Graph 1: Age-wise and gender-wise distribution of diabetic patients with hypothyroidism



RESULTS

In the present study, a total of 100 diabetic patients and a total of 100 controls were analyzed. Among the diabetic patients, the prevalence of hypothyroidism was 26 percent while among the controls; the prevalence of hypothyroidism was 12 percent. Significant results were obtained while comparing the prevalence of hypothyroidism among diabetic patients and controls. In the present study, while studying the age wise distribution of diabetic

patients with hypothyroidism, non-significant results were obtained. 38.46 percent of the patients each belonged to the age group of more than 50 years and 30 to 50 years. In the present study, while studying the gender wise distribution of diabetic patients with hypothyroidism, non-significant results were obtained. 53.84 percent of the patients were males while the remaining 46.16 percent of the patients were females.

DISCUSSION

Conflicting results are obtained when circulating insulin level is measured in thyrotoxicosis. The role of glucagon and alpha-cell sensitivity is unclear. Diabetes mellitus influences the assessment of thyrotoxicosis by falsely decreasing the blood levels of thyroxine (T4) and triiodothyronine (T3) during severely uncontrolled hyperglycemia.^{4,5}

The role of hyperthyroidism in diabetes was investigated in 1927, by Coller and Huggins proving the association of hyperthyroidism and worsening of diabetes. It was shown that surgical removal of parts of thyroid gland had an ameliorative effect on the restoration of glucose tolerance in hyperthyroid patients suffering from coexisting diabetes.³ There is a deep underlying relation between diabetes mellitus and thyroid dysfunction. A plethora of studies have evidenced an array of complex intertwining biochemical, genetic, and hormonal malfunctions mirroring this pathophysiological association. 5' adenosine monophosphate-activated protein kinase (AMPK) is a central target for modulation of insulin sensitivity and feedback of thyroid hormones associated with appetite and energy expenditure. Autoimmunity has been implicated to be the major cause of thyroid-dysfunction associated diabetes mellitus.⁴⁻⁷

In the present study, a total of 100 diabetic patients and a total of 100 controls were analyzed. Among the diabetic patients, the prevalence of hypothyroidism was 26 percent while among the controls; the prevalence of hypothyroidism was 12 percent. Significant results were obtained while comparing the prevalence of hypothyroidism among diabetic patients and controls. Demitrost L et al prevalence of thyroid dysfunction in type 2 DM in Manipur, India. In this retrospective study, data of 202 Type 2 DM patients who attended the diabetic clinic of the Regional Institute of Medical Sciences, Imphal from January 2011 to July 2012, and whose thyroid stimulating hormone (TSH) level was investigated were included. The inclusion criteria are known cases of type 2 DM. Exclusion criteria are patients with previous history of hypothyroidism and those on drugs affecting the thyroid profile. Out the 202 type 2 DM patients for the study of which 61 are males and 141 are females, 139 (68.8%) are euthyroid, 33 (16.3%) have subclinical hypothyroidism (10 males and 23 females), 23 (11.4%) have hypothyroidism (6 males and 17 females), 4 (2%) have subclinical hyperthyroidism and 3 (1.5%) are hyperthyroidism cases. Maximum cases were of hypothyroidism (subclinical and clinical) seen in the age group of 45-64 years. Patients with BMI > 25 were at increased risk of having hypothyroidism ($P < 0.016$). Prevalence of hypothyroidism is quite high in type 2 DM patients above 45 years and more so if their BMI is over 25.⁸

In the present study, while studying the age wise distribution of diabetic patients with hypothyroidism, non-significant results were obtained. 38.46 percent of the patients each belonged to the age group of more than 50 years and 30 to 50 years. While studying the gender wise distribution of diabetic patients with hypothyroidism, non-significant results were obtained. 53.84 percent of the patients were males while the remaining 46.16 percent of the patients were females. Excessive thyroid hormones increase the rate of digestive tract absorption and increase insulin resistance and insulin degradation. In hypothyroidism, liver

secretion of glycogen decreases, so does degradation, leading to increased levels of glycogen. Absorption of glucose from the gastrointestinal tract is slowed, and glucose utilization is slowed in the peripheral tissues. The availability of gluconeogenic substrate is decreased. Hyperthyroidism impairs glycemic control in diabetic subjects, while hypothyroidism increases susceptibility to hypoglycemia thus complicating diabetes management.⁹⁻¹¹

CONCLUSION

Under the light of above obtained data, it can be concluded that diabetic patients are significantly affected with hypothyroidism. The relationship between thyroid disorders and diabetes mellitus is characterized by a complex interdependent interaction. Therefore; further studies are recommended.

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