

# Prevalence of Thyroid Disorders amongst Patients with Diabetics - A Hospital based Study

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## ABSTRACT

**Introduction:** Diabetes mellitus and thyroid disorders are one of the most frequently seen conditions in clinical practice. Diabetes is the commonest endocrine disorder occurring worldwide. This increase in prevalence is due to change in lifestyle habits like consumption of fermentable carbohydrates and sedentary habits. Various long term complications have been associated with diabetes mellitus like neuropathy, nephropathy and retinopathy. One such association which has gained recent popularity is its association with thyroid dysfunction. The aim of present study is to estimate the relationship between diabetes mellitus and thyroid dysfunctions and to evaluate the prevalence of thyroid diseases amongst diabetics.

**Material and methods:** This prospective study comprised of 120 subjects, out of which 60 were healthy which were categorised as controls and 60 suffering from type 2 diabetes mellitus categorised as cases. Any patient with a history of type I diabetes, previous thyroid disorder, hypertension, liver disease, renal disease, pregnant or lactating mothers were excluded from the study. The study was approved by institute's ethical committee and all the patients were informed about the study and a written informed consent was obtained in patients own vernacular language. Glucose was estimated by glucose oxidase peroxidase test. T3, T4 and TSH levels were estimated by immunoassay. The data thus obtained was arranged in a tabulated form and expressed as mean $\pm$  Standard deviation. Prevalence of thyroid disorder was expressed as percentage.

**Results:** In the case group there were 32 males and 28 females. The mean age group of females in this study was 48.9 $\pm$  7.2 years and males were 53.7 $\pm$  6.8 years. There were 23% of the patients in the case group who were suffering from hypothyroidism. Approximately 10% of the patients with diabetes had hyperthyroidism. There were 40 out of 60 patients who were euthyroid. There was a marked increase in level of TSH amongst diabetic patients with hypothyroidism. In control group, the mean TSH levels were 2.66 uIU/ml. Diabetic patients with hyperthyroidism showed a significant decrease in the level of TSH. The level of TSH was 0.04uIU/ml. On applying unpaired student t test, the p value came out to be less than 0.05, indicating that there is a significant change in level of T3, T4 and TSH amongst cases and controls.

**Conclusion:** Our study shows a significant correlation between diabetes mellitus and thyroid dysfunctions. There were 23% patients who suffered from hypothyroidism.

**Keywords:** Diabetes, Glucose, Hypothyroidism, Hyperthyroidism

prevalence is due to change in lifestyle habits like consumption of fermentable carbohydrates and sedentary habits. Thyroid disorders are also commonly occurring conditions amongst general population. In Whickham survey, which was conducted in England in the year 1970, the prevalence of thyroid disorders was 6.6%.<sup>6</sup>

Various long term complications have been associated with diabetes mellitus like neuropathy, nephropathy and retinopathy. One such association which has gained recent popularity is its association with thyroid dysfunction. The influence of thyroid disorder on diabetes has been known since 1979.<sup>7</sup> There exists a strong interrelationship between insulin and iodothyronines on the synthesis and breakdown of carbohydrates, lipids and proteins.<sup>8,9</sup> Thyroid dysfunctions are difficult to detect in diabetics as they have similar manifestations. Patients with severe diabetic neuropathy often have oedema, weight gain and pallor which can be mistaken with hypothyroidism.<sup>10</sup> Patients with diabetes can suffer from both clinical and subclinical thyroid disease; therefore it is very important to screen patients for thyroid dysfunctions. The aim of present study is to estimate the relationship between diabetes mellitus and thyroid dysfunctions and to evaluate the prevalence of thyroid diseases amongst diabetics.

## MATERIAL AND METHODS

This prospective study comprised of 120 subjects, out of which 60 were healthy which were categorised as controls and 60 suffering from type 2 diabetes mellitus categorised as cases. Patients with diabetes mellitus were categorised according to ADA specifications i.e. having  $> 120\text{mg/dl}$  of fasting glucose levels.<sup>11</sup> Any patient with a history of type I diabetes, previous thyroid disorder, hypertension, liver disease, renal disease, pregnant or lactating mothers were excluded from the study. The study was approved by institute's ethical committee and all the patients were informed about the study and a written informed consent was obtained in patients own vernacular language.

**Procedure:** under complete aseptic conditions, 4ml of blood was withdrawn from anticubital vein by a disposable syringe. Patients were kept fasting overnight. Collected blood sample was centrifuged and serum thus obtained was used for estimation of glucose and thyroid levels. Glucose was estimated by glucose oxidase peroxidase test. T3, T4 and TSH levels were estimated

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## INTRODUCTION

Various endocrine and non endocrine organs except for pancreas influence diabetes mellitus.<sup>1-3</sup> Diabetes mellitus and thyroid disorders are one of the most commonly seen conditions in clinical practice. Diabetes is the commonest endocrine disorder worldwide.<sup>4</sup> In a study by WHO, its prevalence was 2.8% in the year 2000 and can shoot up to 4.4% by 2030.<sup>5</sup> This increase in

by immunoassay

The data thus obtained was arranged in a tabulated form and expressed as mean $\pm$  Standard deviation. Prevalence of thyroid disorder was expressed as percentage. Unpaired t test was applied as a test of significance and p value of less than 0.05 was considered significant.

## RESULTS

In this study a total of 120 subjects were enrolled and this study was conducted over a period of one year. In the case group there were 32 males and 28 females. The mean age group of females in this study was 48.9 $\pm$  7.2 years and males were 53.7 $\pm$  6.8 years.

Table 1 shows the prevalence of thyroid dysfunctions amongst cases and controls. There were 23% of the patients in the case group who were suffering from hypothyroidism. Approximately 10% of the patients with diabetes had hyperthyroidism. There were 40 out of 60 patients who were euthyroid. All the patients in the control group had normal thyroid levels i.e. they were euthyroid.

Table 2 shows the mean levels of T3, T4 and TSH amongst cases and controls. There was a significant decrease in the level of T3 and T4 in diabetic patients having hypothyroidism compared to controls. There was a marked increase in level of TSH amongst diabetic patients with hypothyroidism. In control group, the mean TSH levels were 2.66 uIU/ml. Diabetic patients with hyperthyroidism showed a significant decrease in the level of TSH. The level of TSH was 0.04uIU/ml. On applying unpaired student t test, the p value came out to be less than 0.05, indicating that there is a significant change in level of T3, T4 and TSH amongst cases and controls.

## DISCUSSION

Diabetes mellitus is a complex multifactorial disease with varying aetiologies but in most of the cases there is genetic predisposition. It has been associated with various physiologic changes in different organ systems of human body. The varying complications are associated with the morbidity and mortality associated with diabetes.<sup>12</sup> Thyroid hormones i.e. T3 and T4 act as antagonist for insulin which also potentiates its action.<sup>9</sup> The synthesis of thyroid hormone releasing hormone generally

decreases in patients with diabetes.<sup>13,14</sup>

According to our study there is an increased association of thyroid dysfunction and diabetes. In our study 23% of the diabetic patients had hypothyroidism and 10% of the patients had hyperthyroidism. In a study conducted by Makander et al<sup>5</sup>, 22% of the diabetic patients were hypothyroid and 10% of the patients were hyperthyroid. In another study conducted by CEJ udiong et al<sup>15</sup> in Nigerian population, they concluded that 46.5% of the diabetic population had abnormal levels of thyroid hormones. Out of these 26.6% were hypothyroid and 19.9% were hyperthyroid. The prevalence of thyroid dysfunction was higher in their study compared to ours. Various other studies which showed similar results were studies by Suzuki et al<sup>14</sup>, Mazin et al<sup>16</sup>, Bassyoni et al<sup>17</sup> and Pasupathi et al.<sup>12</sup>

In a study conducted by Bharat et al<sup>18</sup>, the levels of TSH significantly increased amongst diabetic patients but T3 levels showed no significant change amongst diabetics and non diabetics. In our study both TSH and T3 levels showed significant alterations amongst cases and controls. Various mechanisms have been implicated in the alteration of thyroid hormone levels amongst diabetics. Firstly, it could be due to medications like phenylthiourea which decrease the levels of T4 and thus increases TSH level.<sup>19</sup> Secondly insulin is anabolic in nature and TSH is a protein and hence it enhances TSH turnover. Diabetics are mostly associated with stress which can lead to changes in the hypothalmo pituitary axis. Recently another pathway which is mediated by C peptide has also been shown to influence the thyroid status. It increases the activity of sodium potassium ATPase pump which leads to increase in protein synthesis.

The major limitations in our study were that the sample size was quite small and the study was conducted over a short duration of time

## CONCLUSION

Our study shows a significant correlation between diabetes mellitus and thyroid dysfunctions. There were 23% patients who suffered from hypothyroidism. Therefore, it is imperative for all the patients with diabetes to get their thyroid hormone assays done to prevent any undue or overt complications.

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Thyroid status	Diabetic patients (n=60)	Healthy controls (n=60)
Hypothyroid	14	0
Hyperthyroid	6	0
Euthyroid	40	60
Total	60	60

Table-1: Thyroid status

Hormone Levels		Healthy controls	Diabetic with hypothyroidism	Diabetic with hyperthyroidism	P value
T3 (ng/ml)	Mean $\pm$ SD	1.18 $\pm$ 0.42	0.32 $\pm$ 0.68	2.09 $\pm$ 0.80	<0.05
	Range	0.24-1.9	0.1-1.23	1.80-3.91	
T4 (ug/ml)	Mean $\pm$ SD	7.52 $\pm$ 2.42	3.27 $\pm$ 2.12	16.74 $\pm$ 5.43	<0.05
	Range	2.76-12.05	0.79-10.1	3.98-26.6	
TSH (uIU/ml)	Mean $\pm$ SD	2.66 $\pm$ 3.90	43.07 $\pm$ 31.87	0.04 $\pm$ 0.07	<0.05
	Range	0.11-32.4	8.9-119.6	0-0.2	

Table-2: Hormone levels

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