

# A Study of Relation between Thyroid Dysfunction and Diabetes Mellitus among Cases Attending a Tertiary Care Hospital of South Karnataka

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## ABSTRACT

**Introduction:** Diabetes mellitus and thyroid diseases are two common endocrinopathies seen in the general population. The aim of the present study was to study the relation between thyroid dysfunction and diabetes mellitus among the diabetic patients attending Kasturba Hospital, Manipal.

**Materials and Methods:** A retrospective case control study was conducted among 124 diabetic patients who attended Kasturba Hospital, Manipal, a tertiary referral hospital of south Karnataka. The diabetic patients with normal thyroid functions were considered as control subjects and diabetic patients with abnormal thyroid functions as cases.

**Results:** The proportion of hypothyroidism among diabetic females was higher than in males in the study population. There was a significant risk for development of hypertension among the diabetic patients having thyroid dysfunction. There was no significant association between diabetic complications and thyroid dysfunction. There was no significant association between thyroid dysfunction and lipid profile, protein and creatinine levels in diabetic patients.

**Conclusion:** The ability to diagnose and treat unsuspected thyroid dysfunction in diabetic populations may result in better control of the diabetes, hypertension as well as of the dyslipidaemic states, thereby greatly enhancing the quality of life.

**Keywords:** Hypothyroidism, Hyperthyroidism, Endocrine, Hypertension

absence of thyroid dysfunction among diabetic patients. The reported prevalence of thyroid dysfunction in diabetes varies from 2.2 to 17%.<sup>5</sup>

The present investigation is an attempt to study how thyroid function affects diabetes and glycemic control. It is also of interest to assess how both the disorders superimposed could affect the lipid parameters, and thereby the general well being of the individuals. The aim of the present study is to study the relation between thyroid dysfunction and diabetes mellitus among the diabetic patients attending Kasturba Hospital, Manipal.

Objectives of the research were to compare the complications in diabetic patients with and without thyroid dysfunction and to study thyroid function status, in relation to the age and sex, fasting lipid profile, HbA1c, serum creatinine levels, serum total protein and albumin values.

## MATERIALS AND METHODS

A retrospective case control study was conducted among 124 diabetic patients who attended Kasturba Hospital, Manipal, a tertiary referral hospital of south Karnataka. The diabetic patients with normal thyroid functions were considered as control subjects and diabetic patients with abnormal thyroid functions as cases.

### Inclusion criteria

1. All diabetic patients who visited as outpatient or inpa-

## INTRODUCTION

India is home to 50.8 million diabetics, making it the world's unchallenged diabetes capital.<sup>1</sup> Diabetes mellitus is a metabolism disorder. Diabetes mellitus and thyroid diseases are two common endocrinopathies seen in the general population. Insulin and thyroid hormones are intimately involved in cellular metabolism and thus, an excess or deficit of either of these hormones could result in the functional derangement of the other.

The prevalence of thyroid disease in patients with diabetes is significantly higher than that in the general population. It has been reported as 13.4%, with the highest in patients with type 1 diabetes (31.4%)<sup>2</sup> and lowest in patients with type 2 diabetes (6.8%).<sup>3,4</sup> The association between diabetes mellitus and primary hypothyroidism is well recognized and a lot of studies in different countries have tried to estimate the prev-

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tient to Kasturba Hospital, Manipal were selected on the basis of their blood sugar values (fasting sugar level >126 mg/dl and postprandial level >200mg/dl).

- In addition to this, diabetics with or without thyroid dysfunction were chosen. The thyroid function is considered to be abnormal when the TSH, T<sub>3</sub> and T<sub>4</sub> values are increased or decreased from the normal range (Normal ranges for TSH: 0.3- 4.5 UIU /ml, T<sub>3</sub>: 0.8 – 2 ng/ml and T<sub>4</sub>: 4.5 -12 g/ dl).

#### Exclusion criteria:

- Non-diabetic patients with abnormal thyroid functions were not selected for the study.

## METHODOLOGY

After obtaining permission from the Hospital Authorities and from the Institutional Ethical Committee, the records of the diabetic patients with and without thyroid disorder who attended the hospital from January 2010 to July 2011 were reviewed. List of cases fulfilling the eligibility criteria was made. 68 diabetics without thyroid disorder and 56 diabetics with thyroid disorder were included in this study depending on availability of their serum values and the diagnosis in the medical records.

A semi-structured proforma was used to collect the details of the patients. Data on fasting lipid profile, HbA1c, serum creatinine levels, serum total protein and albumin values of these patients were collected from their clinical records. Medical history regarding the age at diagnosis of diabetes, the presence of cardiovascular disease, the presence of diabetic complications, and current medication, were obtained

from the medical records of the patients.

## STATISTICAL ANALYSIS

Data analysis was done using SPSS v16.0 (SPSS South Asia, Bangalore). Categorical data was expressed as frequency and percentage. Risk estimation was done between cases and control by using Odds ratio. Non-parametric test (Mann-Whitney test) was used to analyse the continuous data among cases and control to find the association. The significance level (p value) of 0.05 was taken as critical value to see the difference between the mean values of cases and controls.

## RESULTS

124 known and newly diagnosed diabetic patients were considered for this study. Out of the 124 subjects, 65 were male and 59 were female. All subjects were type 2 diabetics. The mean age of the sample was 55.8 years. The average duration since detection of diabetes was 8 years. Among 124 patients, 56 had thyroid dysfunction, out of which 12 (9.7%) had hyperthyroidism and 44 (54.8%) had hypothyroidism. Among the patients included in this study, 39 (31.5%) had ischaemic heart disease, 21 (16.9%) had retinopathy, 16.1% had neuropathy and 8.9% had nephropathy. In the study group, i.e., patients with hypothyroidism and diabetes (56 cases), majority of them were females – 32 (54.2%).

Table 1 depicts the comparison of categorical parameters between cases and control subjects. There is a higher proportion of hypertension among the cases when compared to that of the control group (76.8% against 58.8%). Therefore,

Parameter	Cases (n=56)	Control (n=68)	Odd's Ratio	95% confidence interval
HTN	43 (76.8%)	40 (58.8%)	2.315	1.055, 5.082
Hypoglycaemia	3 (5.4%)	1 (1.5%)	3.792	0.383, 37.513
Ketoacidosis	3 (5.4%)	1 (1.5%)	3.792	0.383, 37.513
Neuropathy	10 (17.9%)	10 (14.7%)	1.261	0.484, 3.287
Nephropathy	5 (8.9%)	6 (8.8%)	1.013	0.292, 3.512
Retinopathy	11 (19.6%)	10 (14.7%)	1.418	0.553, 3.632
CVA	2 (3.6%)	3 (4.4%)	0.802	0.129, 4.979
IHD	17 (30.4%)	22 (32.4%)	0.911	0.425, 1.955
PVD	4 (7.1%)	5 (7.4%)	0.969	0.247, 3.796

**Table-1:** Comparison of categorical parameters between cases and control

Parameter	Hyperthyroidism (n=12)	Hypothyroidism (n=44)	None (n=68)	p value
HbA1c	8.2 (6.5, 9.3)	7.9 (6.975, 10.22)	9.15 (7.57, 12.4)	0.042
TC	153 (125.75, 189.5)	171.5 (144.25, 204)	169 (142.5, 199.75)	0.436
TAG	113 (73.75, 197)	134 (95, 163)	137.5 (98.25, 195)	0.514
HDL-C	38 (33.75, 56.5)	43 (33, 48)	31 (24.24, 39)	0.000
LDL-C	37.8 (74.3, 105.25)	95 (79.6, 123.2)	110.6 (85.2, 125.4)	0.120
TP	6.5 (5.95, 6.825)	7.4 (6.625, 7.8)	6.9 (6.6, 7.3)	0.002
Albumin	4 (3.8, 4.1)	4 (3.62, 4.27)	4.2 (3.925, 4.475)	0.035
Creatinine	0.8 (0.6, 0.9)	1 (0.7, 1.2)	0.85 (0.725, 1.1)	0.203
Urea	27.5 (20.5, 34.75)	24.5 (17, 39.25)	25 (21, 41)	0.527

**Table-2:** Association between thyroid dysfunction and biochemical parameter (Median and Inter Quartile Range)

there is a higher risk for development of hypertension among diabetics with thyroid dysfunction than those with euthyroid status (Odd's ratio=2.315).

In this study, glycated haemoglobin (HbA1c) value was found to be high in both cases and control and was statistically significant ( $p=0.042$ ). The value is higher in patients having diabetes with normal thyroid function (HbA1c=9.15%) than in those having thyroid dysfunction (HbA1c=8.2%). There is no significant correlation between thyroid dysfunction and lipid profile, protein and creatinine levels in diabetic patients (as shown in Table 2).

## DISCUSSION

While the prevalence of thyroid diseases in the general population has been quoted in literature as 6.6%, that among diabetics is as high as 10.8%.<sup>6</sup> Hyperthyroidism has been known to affect glucose homeostasis resulting in hyperglycaemia and worsening of glycaemic control in diabetics.<sup>7,8,9</sup> However, in the present study, we have obtained results that negate this statement. In our study, it has been shown that the glycaemic control is actually worse in patients with no thyroid dysfunction. This is probably due to the smaller sample size that was employed in the study.

Also, thyroid dysfunction has a propensity to cause lipid dysregulation, as evidenced in several studies.<sup>10</sup> But, in the current study, the presence of thyroid disorders has not caused a significant LDL increase. HDL has been found to be lower in the population with euthyroid status, rather than in the subset with thyroid dysfunction.

## CONCLUSION

Several studies, including ours, have shown that thyroid disorders and diabetes mellitus can co-exist in the clinical scenario. The incidence of hypertension has been found to be significantly higher in diabetics who also have thyroid dysfunction. Hence, early diagnosis and management of hypertension is essential in such patients. The ability to diagnose and treat unsuspected thyroid dysfunction in diabetic populations may result in better control of the diabetes as well as of the dyslipidaemic states, thereby greatly enhancing the quality of life.

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