

Thyroid dysfunction in patients with diabetes mellitus in care center of south-eastern Rajasthan, India



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Abstract

Background: Most common endocrine disorder in day-to-day life are diabetes and thyroid disorder. In long term, these patients may lead to development of cardiovascular disease and other metabolic derangements. In diabetics prevalence of thyroid dysfunction is 10 to 24%. Thyroid dysfunction prevalence in diabetics patient was objective of the present study conducted at Jhalawar medical college and SRG Hospital Rajasthan. **Materials and Methods:** Retrospective study conducted in patients admitted between July 2017 to December 2018 at department of medicine Jhalawar medical college and SRG Hospital, Jhalawar Rajasthan. 130 patients (age group ≥ 30 yrs.) of diabetes mellitus and 125 of same age group & having glucose levels normal were taken for the study. The Ethical committee clearance was taken. Fasting plasma glucose (FPG) levels of more than 126 mg/dl twice at different occasions were labeled diabetics and subjects having FPG levels less than 126 mg/dl at two occasions were controls. **Result:** Prevalence of thyroid dysfunction in case group (diabetic mellitus patient) was 24.6% and prevalence of thyroid dysfunction in control group was 6.4%. Among thyroid dysfunction, prevalence of subclinical hypothyroidism was highest. **Conclusion:** Thyroid dysfunction had higher prevalence in diabetes patients.

Keywords: thyroid dysfunction, glycosylated hemoglobin (HbA1c), diabetes mellitus

Introduction

Most common endocrine disorder in clinical practice are diabetes and thyroid disorder. Thyroid dysfunction and diabetes is also most common metabolic disorder. But among diabetes and thyroid dysfunction, diabetes is more common¹.

In general population, prevalence of thyroid dysfunction varies from 6.6% to 13.4%^{2,3}. In late 1970s data collected from Wickham survey in north of England shows prevalence of thyroid dysfunction in adults' population is 6.6%⁴. Thyroid disorder and Diabetes mutually influence one another and association between these two are reported in literature⁵. Cellular metabolism requires both insulin and thyroid hormone. Any deficiency or excess of them would result in functional alteration in each other.

Decrease in glycosylated hemoglobin (HbA1c) is due to increase in erythropoiesis when we give thyroid replacement but not due to plasma glucose levels⁶.

A number of studies have evidenced complex intervening biochemical, genetic and hormonal dysfunction resembling this association between DM and thyroid dysfunction^{7,8}.

Material and Methods

The current study was a retrospective study. This study was conducted in the Department of General Medicine at Jhalawar medical college and SRG Hospital, Jhalawar, Rajasthan.

The data collection for the study was done in patients admitted between July 2017 to December 2018 at department of medicine. All the type-2 Diabetic patients and normal subjects with no diabetes aged more than 30 years admitted in the General Medicine department at Jhalawar medical college were considered as

the study population. Patients with Type 2 diabetes and normal subjects aged more than 30 years irrespective of glucose control and treatment (OHA/insulin) were included in the study. The general and local examination was performed by measuring BMI, waist circumference. Analysis was done, based on patient’s lab values for FBS, PPBS, HBA1C, TSH and Lipid Profile.

Approval of the study was obtained by the institutional human ethics committee. Informed written consent was obtained from all the study participants, and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained.

The results of thyroid function were classified on the use of the following as normal reference range
TSH: 0.4 -4.5 m IU/ml, T3: 0.69 -2.15 ng/ml, T4: 52 -127 ng/ml

Hypothyroidism when T3, T4 were less and TSH greater than the reference ranges.

Hyperthyroidism when T3, T4 were greater and TSH less than the reference ranges

Subclinical hypothyroidism when T3, T4 were within normal range and TSH greater than the reference ranges. The P-value <0. 05 was considered significant. All the analysis was carried out on SPSS 16. 0 version (Chicago, inc, USA).

Inclusion criteria

- All patients with type 2 diabetes mellitus aged more than 30 years.
- All patients of type 2 diabetes mellitus irrespective of glucose control.
- All type 2 diabetic patients irrespective of treatment (OHA/insulin).

Exclusion criteria

- Type 1 diabetes mellitus patients
- Gestational diabetes
- Patients on Steroids
- Patients with pancreatitis
- Patients with CKD

Results

Table 1: HbA1c levels in cases(diabetes) and control group

Parameter	cases	Control	p-value
	130	125	
HbA1c (%)	8.97±2.19	7.19±1.17	<0.0001

Values are given as mean ± SD

Table 2: Thyroid dysfunction types in cases and control groups

Thyroid dysfunction	Diabetics		Control	
	Females	males	Female	males
Hypothyroidism	7	0	5	0
Hyperthyroidism	3	2	1	0
Subclinical hypothyroidism	14	3	2	0
Subclinical hyperthyroidism	2	1	0	0
Total	26	6	8	0

Chi sq =1.87 p value 0.5998(NS)

Table 3: In diabetics group analysis of T3, T4, TSH & HbA1c levels and duration of diabetes.

Parameter	Normal thyroid profile n=98	Abnormal thyroid profile n=32	p-value
T3(ng/ml)	0.99 ±0.30	0.82 ±0.26	0.0048*
T4(ng/ml)	86 ±28	96 ±42	0.1268
TSH (m IU/ml)	2.82 ± 1.54	9.46 ±8.42	<0.0001*
Plasma glucose level (mg/dl)	114 ±21	136 ±32	<0.0001*
HbA1c (%)	7.10 ±2.10	8.86 ±2.92	0.0003*
Duration of disease in years	6.50 ±5.20	11.48 ±6.20	<0.0001*

* Indicate significant values

Table 4: Subject distribution in diabetic patients

HbA1c (%)	% Of subject with normal thyroid profile	% Of subject with abnormal thyroid profile
<7.5	52.9	6.6
7.5-8.5	27.2	20.2
>8.5	20.9	73.2

Age and sex were matched of the cases (diabetic group) and control group. Among study about 130 cases (diabetic group) and 125 (control group) were taken, thyroid dysfunction was common in diabetes mellitus. Subclinical hypothyroidism was more common than other thyroid disorder in our study. Prevalence of subclinical hypothyroidism in case group was 13.07%. Prevalence of hyperthyroidism in case group was 3.84%. Prevalence of hypothyroidism in case group was 5.38%. Prevalence of subclinical hyperthyroidism in case group was 3.07%. Prevalence of thyroid dysfunction in case group was 24.61%. Prevalence of thyroid dysfunction in control group was 6.4% (Table 2). Diabetic subject whose glycosylated hemoglobin level is less than 7.5% with normal thyroid profile was 52.9%. Whereas thyroid dysfunction was seen in 73.2% subjects with glycosylated hemoglobin more than 8.5% (Table 4).

Discussion:

Diabetes mellitus and thyroid disorder are metabolic disorder. In this study 130 diabetic patients were investigated, 24.61% had thyroid dysfunction i.e., 32 diabetic patients had thyroid dysfunction. Among 32 patients 17 had subclinical hypothyroidism i.e., 13.07 %. In the control group (n=125) thyroid dysfunction is seen in 8 subjects i.e., 6.4 %.

Table 5: Different studies and prevalence of thyroid dysfunction in type 2 DM

Study	Prevalence of thyroid disorder
Papazafiropoulou et al15	12.3%
Nobre et al11	12.7%
Radaideh et al14	12.5%
Celani et al10	31.4%
Smithson	10.8%
Udiong et al	46.5%
Present study	24.5%

Subclinical hypothyroidism is 10.76%, most prevalent thyroid disorder in our study in diabetic subjects followed by hypothyroidism is 5.38%, followed by subclinical hyperthyroidism is 3.07%. Thyroid disorder with maximum prevalence is subclinical hypothyroidism and least prevalent is subclinical hyperthyroidism. Our study results are in concordance with the study's results of Perros et al⁹, Celani et al¹⁰, Nobre et al¹¹, Chubb et al¹², Babu et al¹³ and Radaideh et al¹⁴

In our study prevalence of thyroid dysfunction in females is more as compared to males (81.25% in females to 18.75% in males). Present study result was consistent with Papazafropoulou et al¹⁵, Celani et al¹⁰, Vondra et al¹⁶, Pimenta et al¹⁷, Babu et al¹³, and Michalek et al¹⁸, in these studies prevalence of thyroid dysfunction is more in diabetic females as compared to diabetic males.

Diabetes occurs due to lack of insulin or its action and thyroid dysfunction occur due to imbalance in thyroid hormone levels. When these two disorders co-exist in same individual, more metabolic problems result.

Ramos et al had conducted studies and measured anti TPO antibodies and found that antibodies were positive in 18.2% of thyroid dysfunction subjects¹⁹. Palma et al conducted studies and found that anti TPO antibodies was positive in 12 (14.6%) subjects with T1DM and 30 (9.9%) subjects with T2DM²⁰. Kim et al conducted studies and found that hypothyroidism falsely increases the levels of glycosylated hemoglobin HbA1C and the cause is decrease erythropoiesis. Replacement of thyroid hormone result in decreasing the levels of HbA1C, which is due to increased erythropoiesis but not due any change in glucose levels⁴.

This study had some limitations as thyroid antibodies assay were not the part of the study, if assay was done, study would have been more informative.

Conclusion:

Diabetes patient have higher prevalence of thyroid dysfunction, being more specific, diabetic females have higher prevalence. Among thyroid dysfunctions, subclinical hypothyroidism is most prevalent. Further prospective studies are needed to understand the complication of DM and thyroid disorder

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