

A Study on Relation of Thyroid Profile in Patients of Type2 Diabetes Mellitus in a Tertiary Care Hospital in Kanpur

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Abstract

Original Research Article

Background: Diabetes Mellitus refers to a group of metabolic disorder, characterised by hyperglycemia and disturbance of carbohydrate, fat and protein metabolism due to absolute or relative deficiency of insulin secretion or insulin action or together. Thyroid hormones play an important role in cell differentiation during development and also help in maintaining maintain thermogenesis and metabolic homeostasis in the adults. **Methods:** Study was conducted on 120 patients (62 males and 58 females) of age group 35 to 70 years of diagnosed type 2 Diabetes Mellitus. Thyroid dysfunction and relationship between various parameters like routine, blood sugar, HbA1C level and thyroid profile in type 2 Diabetic Mellitus patients was done. **Study period:** January 2018 to October 2019. **Result:** Out of total study subject 66.66% (80 patients) were normal and 33.34% (40 patients) were having deranged thyroid function.

Keywords: Thyroid stimulating hormone, diabetes mellitus, tri-iodothyronine, tetra-iodothyronine.

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INTRODUCTION

Diabetes Mellitus refers to a group of common metabolic disorder, characterised by hyperglycemia and disturbance of carbohydrate, fat and protein metabolism associated with absolute or relative deficiency of insulin secretion or insulin action or together secreted by the beta cells of pancreas. Uncontrolled hyperthyroidism in diabetic patients may trigger hyperglycemic emergencies while recurrent hypoglycemic episodes have been reported in diabetic patients with hypothyroidism- Kadiyala R *et al.*, [1]. Poor glycemic control will cause disorder like dyslipidemia, hypothyroidism, cardiac disease, central nervous system problems and poor control of infections. The prevalence of thyroid disease was found to be 13.4% and was highest 31.4% in type1 diabetic females and lowest in type 2 diabetic males Perros P *et al.*, [2]. In India, Type 2 Diabetes mellitus is an epidemic disorder due to social influence and changes in life style. The thyroid hormones secreted by thyroid gland play an important role in cell differentiation during development and help to maintain thermogenesis and metabolic homeostasis in the adults. In addition, they have a crucial role in maintaining cellular homeostasis. When thyroid hormone levels in the body are out of balance, they can cause multiple disorders like diabetes mellitus,

cardiovascular disease, and chronic liver disease. Diabetes and thyroid disease are the generally two common and important endocrine disorders seen among adults population. Excess or deficiency of either insulin or thyroid hormones can result in functional abnormalities of one another, as both of them are closely involved in cellular metabolism. According to Vinu Vij *et al.*, [3] in type 2 diabetes patients, thyroid dysfunction was 28.75% and normal thyroid function was 71.25% which also support in favour of our study.

AIM AND OBJECTIVES

To investigate role of serum TSH level in Type 2 Diabetes mellitus patient

1. To estimate the thyroid hormones Serum FT3, Serum FT4 and TSH level in Type2 Diabetes mellitus.
2. To determine the prevalence and degree of various Thyroid dysfunction among type 2 diabetes mellitus patients
3. To study the correlation between Diabetes mellitus and Thyroid dysfunction in type 2 diabetic subjects.

MATERIAL AND METHODS

Study was conducted on 120 patients between 35 to 70 years of age. The male patients were 62 and female were 58. The patients were diagnosed of type 2 Diabetes Mellitus. Study subjects were taken from IPD and OPD of KPS institute of Medicine, LLR Hospital, GSVM Medical College Kanpur and consent was obtained before the start of study. The study period was from January 2018 to October 2019. The study was observational, cross sectional, hospital based study and most suitable statistical tools were applied for data analysis.

INCLUSION CRITERIA

- Individual with previously diagnosed T2DM.

EXCLUSION CRITERIA

- Type 1 diabetes mellitus
- T2 DM patient with no history of DKA/Insulin therapy/OHA therapy.
- Previous history of thyroid diseases/Clinical hypothyroidism/Subclinical or overt hyperthyroidism
- Treatment with levothyroxine or anti-thyroid drug
- Pregnancy/Acute or chronic infection/Malignancy
- Kidney disease (GFR less than 30)/other than diabetic kidney disease.

INVESTIGATION

- Routine investigation
- Blood sugar(Fasting & Post Prandial)
- HbA1c
- **Thyroid Profile**(S.TSH, S. Free T3 & S. Free T4)
Diagnosis of Diabetes (**ADA 2011**)

Pre Diabetes

- HbA1c value-5.7-6.4%
- Fasting blood sugar 100-125 mg/dl (5.6-6.9 mmole/L)

Diabetes

- HbA1c value more than 6.5%
- Fasting blood sugar more than 126 mg/dl (7.0mmole/L)
- Fasting is defined as no calorie intake for at least 8 hours OR
- 2 -h PG more than 200 mg/dl (11.1mmole/L) during OGTT.

Statistical analysis: Obtained from study group were compiled and tabulated MS Excel sheet and Master Table was made accordingly.

OBSERVATION

GENERAL PROFILE OF STUDY

In present study most number of patients were comes under 40 to 60 years of age group. Out of which were males 51.6% (62) and female were 48.4% (58). 85.8% (103) were Hindus and 14.2%(17) were Muslims.

Table-1: Distribution of blood glucose and glycosylated haemoglobin values between the T2DM group (n=120)

	GROUP	MEAN	STANDARD DEVIATION
FASTING BLOOD GLUCOSE(mg/dl)	T2DM	196.28	60.92
POST-PRANDIAL BLOOD GLUCOSE(mg/dl)	T2DM	263.88	73.52
Hb1Ac (%)	T2DM	7.99	1.45

Table 2: Descriptive statistics of various thyroid parameters in the T2DM group (n=120)

THYROID BIOCHEMICAL PARAMETER	STUDY	
	MEAN	STANDARD DEVIATION
FREE T3(pg/dl)	2.02	0.85
FREE T4(ng/dl)	1.20	0.58
TSH(μ U/L)	3.84	2.21

Distribution of various thyroid parameters in the study group (n=120): Thyroid parameters in study subjects are given in Table-3.

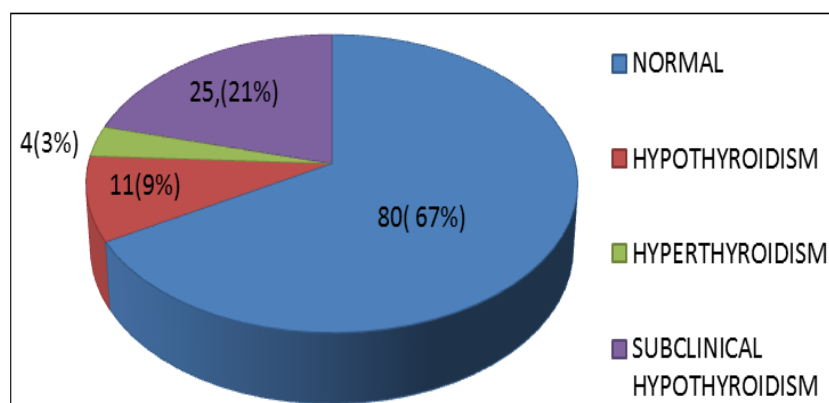
Table-3

THYROID BIOCHEMICAL PARAMETER		STUDY(120)	
		N	%
FREE T3 (pg/dl)	LOW (<1.5)	102	85%
	NORMAL (1.5-4.2)	18	15%
	HIGH (>4.2)	0	0%
FREE T4 (ng/dl)	LOW (<0.7)	8	6.6%
	NORMAL (0.7-1.4)	35	29.1%
	HIGH (>2.0)	77	64.14%
TSH (μ U/L)	LOW (0.3)	0	0%
	NORMAL (0.3-5.5)	100	83.3%
	HIGH (>5.5)	20	16.7%

Distribution of thyroid dysfunction in the study population (n=120): Thyroid dysfunction in study population are given in Table-4 and Chart-1

Table-4

Classification	Frequency	Percent
NORMAL	80	66.66%
HYPOTHYROIDISM	11	9.16%
HYPERTHYROIDISM	4	3.36%
SUBCLINICAL HYPOTHYROIDISM	25	20.85%
TOTAL	120	100%

**Chart-1: Distribution of thyroid dysfunction in the study population (n=120)****Table-5: Distribution of thyroid dysfunction in the study group (n=120)**

Classification	Study Group (120)	
	N	%
NORMAL	80	66.66%
THYROID DYSFUNCTION	40	33.34%
TOTAL	120	100%

Distribution of thyroid dysfunction in the study group (n=40): Thyroid dysfunction in study subjects Table-6 and Chart-2.

Table-6

Classification	Study Group (40)	
	N	%
HYPOTHYROIDISM	11	27.5%
HYPERTHYROIDISM	4	10%
SUBCLINICAL HYPOTHYROIDISM	25	62.5%
TOTAL	40	100%

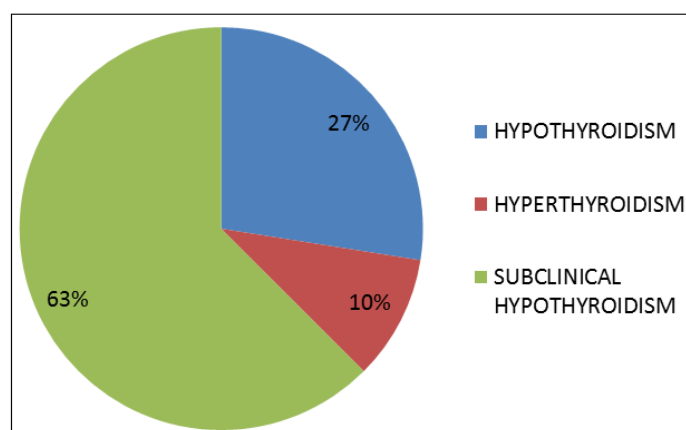


Chart-2

Gender distribution of thyroid status among diabetic subjects in the study group (n=120): Gender wise distribution of thyroid status, in diabetic patients.

Table-7

Thyroid Status	Gender	
	Male	Female
NORMAL	48 77.41%	32 55.17%
HYPOTHYROIDISM	3 4.8%	8 13.79%
HYPERTHYROIDISM	1 1.61%	3 5.17%
SUBCLINICAL HYPOTHYROIDISM	10 16.12%	15 25.86%
TOTAL	62 100%	58 100%

RESULTS

- Total 120 Type 2 Diabetic Mellitus patients were selected for study, majority of subjects belong to 41 to 50 years age group(36.6%) and 51.6%(62) of study subjects were males and 48.4%(58) were females. Majority of patients by religion were Hindus (85.8%) and 14.2% were Muslims.
- The mean value of glycosylated Hb was $7.99\% \pm 1.45$, mean value of fasting blood glucose was $196.28 \text{ (mg/dl)} \pm 60.92$ and post-prandial blood glucose (mg/dl) mean value was 263.88 ± 73.52 . In thyroid profile the Free T3 mean value was 2.02 ± 0.85 , Free T4 mean value was 1.20 ± 0.58 and thyroid stimulating hormone mean value was 3.84 ± 2.21 . In our study group 85% of the study subjects have low Serum Free T3 and 15% have normal Serum Free T3, 0% have high serum FT3, 6.6% of the study subjects have low Serum Free T4, 29.1% have normal Serum Free T4 and 64.14% have high Serum Free T4 and 83.3% of the study subjects have normal Serum TSH and 16.7% have high Serum TSH and 0% patients have low serum TSH. Out of total study subject 66.66% (80 patients) were normal and 33.34% (40 patients) were thyroid dysfunction. In our study out of 40 patients-Hypothyroidism-27.5% (11) patients, hyperthyroidism- 10%(4) patients, Subclinical Hypothyroidism- 62.5%(25) patients. Study of total 120 patients- Total normal males were 77.41%(48), normal females were 55.17%(32), Hypothyroid males were 3(4.8%) and females were 8(13.79%), Hyperthyroid male was 1(1.61%) and female was

3(5.17%) and Subclinical Hypothyroidism males were 16.12%(10) and females were 25.86%(15).

DISCUSSION

Diabetes mellitus is the most important health problem in population worldwide and inspite of advances in treatment, a huge number of patients present with complications owing to poor glycaemic control. One of the vital factors that contribute to deprived glycaemic control is thyroid dysfunction, which tends to happen down with diabetes mellitus. This study sought to find out the prevalence of thyroid dysfunction in people with type 2 diabetes mellitus in LLR Hospital. Diabetes Mellitus is a multi-factorial disorder and a complex interaction between diabetes mellitus and thyroid disorder. Because of insulin and thyroid hormones are closely involved in cellular metabolism, any abnormality of one of them may result in the functional derangement of other. In present study thyroid dysfunction was found in 40 (33.4 %) of 120 type 2 diabetes mellitus subjects. Among subjects with thyroid dysfunction 20.8% had subclinical hypothyroidism. This finding is similar to many studies like Palma *et al.*, [7], Vinu vij *et al.*, [3], Celani *et al.*, [4], Singh *et al.*, [5]. The second common condition was hypothyroidism (9.16 %) followed by hyperthyroidism (3.5%), So hypothyroidism was found to be more common (30%) than hyperthyroidism, study also support the finding of Song F *et al.*, [8].

The reasons for both high and low level of thyroid hormones in diabetes are the modified TRH synthesis and release and also due to various medications used for diabetes mellitus. Many studies concluded that the treatment of diabetes mellitus by sulfonyleureas leads to an increase in occurrence of goitre and hypothyroidism. Subclinical hypothyroidism can cause left ventricular diastolic dysfunction, ovulation disorder, increased expression of LDL receptors, and decreased HDL receptors. It is a threat indicator used for cardiovascular disease especially for atherosclerosis and coronary heart disease. Subclinical hypothyroidisms also independently increase the risk of insulin resistance mainly in muscles and adipose tissue.

Normalization of TSH level will decrease the post prandial blood glucose, HbA1c and lipid profile. Timely diagnosis of Subclinical hypothyroidism in diabetes mellitus patients and adequate treatment is very important to prevent complications. The study population was predominantly male, but the prevalence of hypothyroidism was found higher in females (13.7%) as compared to males (4.8%). This prevalence is comparable to studies of Celani *et al.*, [4] as well as Michalek *et al.*, [6] in which they had also reported prevalence of thyroid disorders higher in diabetic females as compared to diabetic males. This could be partly explained by the fact that autoimmune diseases tend to occur predominantly in females. Study shows, among total males 48 (77.41%) subjects were normal, 3(4.8%) subject were hypothyroid, 1(1.61%) subject were hyperthyroid and 10(16.12%) subjects were subclinical hypothyroid. Out of total females 58(100%), 32(55.17%) subjects were Normal, 8(13.79%) subjects were hypothyroid, 3(5.17%) subjects were hyperthyroid and 15(25.8%) were subclinical Hypothyroid.

CONCLUSION

Present study included 120 subjects of Type 2 Diabetic Mellitus of age group 35 to 70 years. Majority of study the subjects belong to 41 to 50 years age group both in case of males and females. Study concluded that

66.66% subject were normal and 33.34% were having thyroid dysfunction. Thyroid disorder was more common in females (44.76%) than in males (22.53%) and hypothyroidism was more common in females (13.79%) than in males (4.8%).

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