Original Article

Assessment of Thyroid Dysfunction among Patients with Type II Diabetes Mellitus

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Abstract

Introduction: Endocrine disorders are the chronic disorders leading to the significant morbidity. The aim of the study was to find the occurrence of the thyroid dysfunction among the patients with type 2 diabetes mellitus and to analyse the prescribing patterns.

Methods: This is a retrospective study conducted among 180 in-patients of age above 30 years, diagnosed with type II diabetes mellitus along with thyroid dysfunction, admitted in general medicine unit. Patients with type I diabetes mellitus and pregnant women with thyroid disorders were excluded from the study. All the relevant data were collected from patient case notes. The assessment was carried out by using descriptive statistics.

Results: Out of a total 180 patients, females (67.8%) outnumbered the male (32.2%) patients. Higher frequency of disease was observed in an age group of 60-69 years (38.33%). Many patients were reported to have type II diabetes mellitus for a period of 1-5 years before the diagnosis of thyroid dysfunction. Oral hypoglycaemic agents were commonly used to manage type II diabetes mellitus, in which metformin was the most frequently prescribed drug. Hypothyroidism was treated with levothyroxine and carbimazole was frequently used to treat hyperthyroidism.

Conclusion: The occurrence of diabetes with thyroid dysfunction was higher in females. Hypothyroidism was the most common thyroid disorder and was treated by levothyroxine. Oral hypoglycaemic agents were commonly used to treat the hyperglycaemias. Similarly, carbimazole was most frequently used to treat the hyperthyroidism.

Keywords: Carbimazole, Levothyroxine, Oral hypoglycaemic agents, Thyroid dysfunction.

INTRODUCTION

Diabetes mellitus (DM) is a serious metabolic disorder, and its prevalence is increasing steadily.1 It is a non-curable condition characterized by the elevated blood glucose levels due to compromised insulin secretion or insulin resistant.2 Hyperglycaemia and changes in protein and lipid metabolism are the clinical features of diabetes mellitus that can contribute to macrovascular and microvascular complications leading to the financial burden.3

Thyroid dysfunctions including hypo and hyperthyroidism are prevalent among women. Hypothyroidism is a common type of thyroid dysfunction results due to lack of thyroid hormone and occurs more in age above 60 years and above. Excessive production of thyroid hormone leads to hyperthyroidism or thyrotoxicosis.4

Thyroid disorders were shown to be more typical in diabetes than predicted. There are several ways in which diabetes mellitus and thyroid influence one another. The prevalence rate of thyroid disease in general population is 6.6% whereas in diabetes patients are 10.8%.5

Thyroid hormones regulate insulin secretion directly, thus influencing diabetes regulation. There is a decrease of glucose-induced insulin secretion by beta cells in hypothyroidism and increase in the response of beta cells to glucose or catecholamine

in hyperthyroidism.6 The metabolism regulation of lipids, proteins and carbohydrates are mainly carried by thyroid and insulin hormones. So, an imbalance of those two-hormone function can lead to disease condition. That is why diabetes control can be adversely affected by thyroid dysfunction and higher occurrence is shown among type II diabetes mellitus patient.5 Thus, it is recommended that routine investigation on thyroid functioning is essential for all patients diagnosed with type II diabetes mellitus.7 Hence, this study is aimed to describe the type of thyroid disorders and its management in patients with diabetes.

MATERIALS AND METHODS:

Study Design, Duration and Site:

This was a retrospective study of eight-month duration. The study was carried out in the department of general medicine of a charitable teaching hospital with the sample size of 180 patients.

Ethical Approval:

The study was conducted after the approval of human ethics committee/Institutional ethics committee.

Inclusion and Exclusion Criteria:

All in-patients admitted in general medicine unit of age more than 30 years, diagnosed with type II diabetes mellitus with thyroid dysfunction were enrolled in the study after obtaining their volunteer written informed consent. Patients diagnosed with type I diabetes mellitus, pregnant women with thyroid disorders and the terminally ill patients were excluded from this study.

Preparation and Validation of Data Collection Form:

A suitable data collection was prepared after referring various data information sources including primary, secondary, and tertiary sources. The prepared data collection form was approved by the scientific research committee after the validation by the subject expert.

Data Collection:

Patient case sheets were reviewed, and the case sheets were initially scrutinized for the inclusion and exclusion criteria and the case sheets satisfying the inclusion criteria of the students were retrieved from the medical record department of hospital. Patient information including age, gender, drug, dose, duration, and relevant lab investigation reports were documented in a patient data collection form. The filled data collection form was rechecked by at least two other researchers to rectify the discrepancies. The completed forms were further analysed to interpret the findings of the study.

Data Analysis:

All the collected data were entered in the Microsoft Excel and were assessed by using the descriptive statistics and results were presented in the table and figures.

Risk to the Patient:

There were no human subjects involved directly in the study as the study was retrospective in nature. Thus, there were no direct and indirect risk to the patients.

Confidentiality statement:

The data was collected after coding the personal identity of the patients and the confidentiality was maintained during all the stages of the study. The scientific data was only used to disseminate the scientific findings of the study,

RESULTS:

Gender-wise distribution of the patients: A total of 180 patients diagnosed with thyroid dysfunction and type II diabetes mellitus

were enrolled in the study. Among them 67.8% were females and 32.2% are males.

Age-wise distribution of patients: The majority of the patients belongs to the age group of 60-69 years (38.33%), followed by the age group of 50-59 years (29.44%). The lowest frequency (5.6%) was found in the age group of 80-89 years.

Distribution of patients based on duration of type II diabetes mellitus and thyroid dysfunction: The duration of diabetes among the study population was studied. It was noticed that the highest number of patients (55.6%) were diabetics for a period of 1-5 years, followed by 25% of patients more than10 years. Analysis on the duration of thyroid dysfunction among the study population shows that the highest number of patients (82.2%) was having the illness for a period of 1-5 years as referenced in Table 1. And 100 patients were reported to have type II diabetes mellitus for a period of 1-5 years followed by 34 patients for 5-10 years as detailed Table 2.

Table 1: Distribution of patients based on duration of type II diabetes mellitus and thyroid dysfunction

Sl. No	Duration of T2DM	Percentage (%)
1.	1-5Yrs	55.6
2.	5-10Yrs	19.4
3.	>10Yrs	25.0
	Total	**100.0**
	Duration of thyroid dysfunction	
4.	1-5Yrs	82.2
5.	5-10Yrs	13.3
6.	>10Yrs	4.4
	Total	**100.0**

Table 2: Distribution of thyroid dysfunction in relation to duration of type II diabetes mellitus

Sl. No	Thyroid dysfunction	Duration of type II diabetes mellitus			Total
		1-5 years	5-10 years	>10 years	
1.	Hypothyroidism	100	34	0	134
2.	Hyperthyroidism	0	1	14	15
3	Subclinical hypothyroidism	0	0	14	14
4.	Goitre	0	0	11	11
5.	Hypothyroidism + Goitre	0	0	3	3
6.	Subclinical hyperthyroidism	0	0	2	2
7.	Hyperthyroidism + Goitre	0	0	1	1
Total		100	35	45	180

Gender-wise distribution of various types of thyroid dysfunction with diabetes: Thyroid dysfunctions in type II diabetes mellitus showed the highest frequency of hypothyroidism among females (50%) than males (24.44%). The details are illustrated in table 3.

Table 3: Gender-wise distribution of various types of thyroid dysfunction with diabetes

Sl. No	Thyroid dysfunction	Male (%)	Female (%)
1.	Hypothyroidism	24.44	50
2.	Hyperthyroidism	2.77	5.55
3.	Subclinical Hypothyroidism	2.77	5
4.	Goitre	0.55	5.55
5.	Hypothyroidism + Goitre	0.55	1.11
6.	Subclinical Hyperthyroidism	0..55	0.55
7.	Hyperthyroidism + Goitre	0.55	0
		32.23	67.77

Details on the management of thyroid dysfunction in type II diabetes mellitus: The thyroid dysfunctions were managed based on the patient specific parameters. 78.3% of the cases were managed with oral medications. For 15.6% of patients, no specific treatment was given to manage the condition. The details are presented in Figure 1.

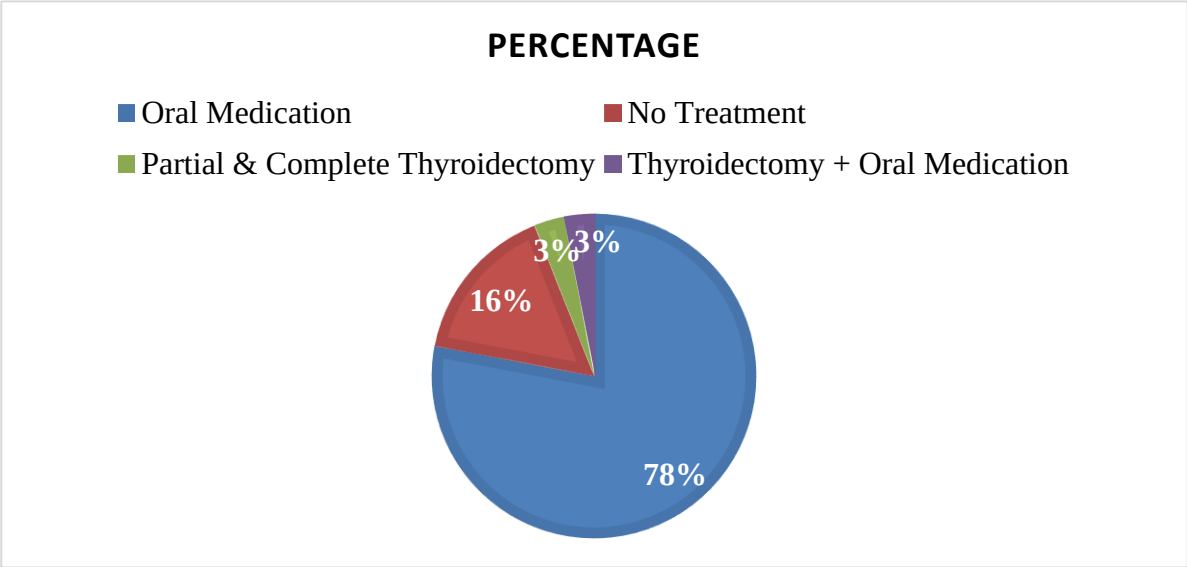

Figure 1: Various approaches in the management of thyroid dysfunction

Out of 180 patients, the highest frequency of diabetics (50%) were managed with oral hypoglycaemic agents (OHA), followed by insulin (30%) and some of the patients were managed non- pharmacologically by modifying their regular diet plans. The details are summarized in Figure 2.

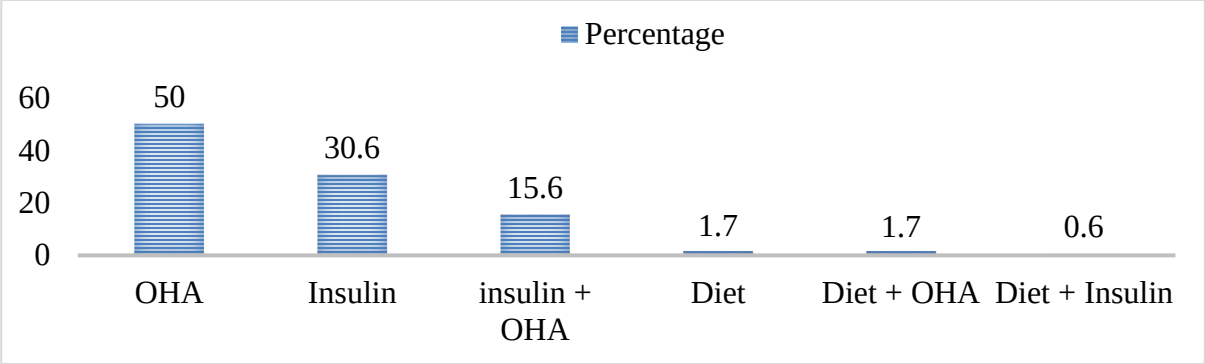

Figure 2: Management of type II diabetes mellitus

Drugs used in the management of Diabetes mellitus: OHA was noticed to be the most commonly prescribed drugs. Among 180 patients, 121 were received with OHA's. A total of 144 OHA's were prescribed among 121 patients. Metformin (37.5%) was considered as the most frequently prescribed drug followed by glimepiride+ metformin (29.16%), voglibose (6.25%). Table 4 represent the other OHA prescribed to the patients.

Table 4: List of different OHAs prescribed

Sl. No	OHA (n=144)	Percentage (%)
1.	Metformin	37.5
2.	Glimepiride + Metformin	29.16
3.	Voglibose	6.25
4.	Glimepiride	4.86
5.	Repaglinide	4.86
6.	Glibenclamide	3.47

7.	Teneligliptin	3.47
8.	Metformin + Glipizide	2.77
9.	Gliclazide + Metformin	2.77
10.	Gliclazide	2.08
11.	Pioglitazone	0.69
12.	Metformin + Voglibose	0.69
13.	Glibenclamide + Metformin	0.69
14.	Glimepiride + Metformin + Pioglitazone	0.69

Insulin Preparations: Among 180 patients 84 patients received with insulin preparations. A total of 96 insulin preparations were prescribed among 84 patients. Human actrapid (48.95%) were found to be most commonly prescribed followed by human mixtard (31.25%), and regular human insulin (9.37%). The details are referenced in Figure 3.

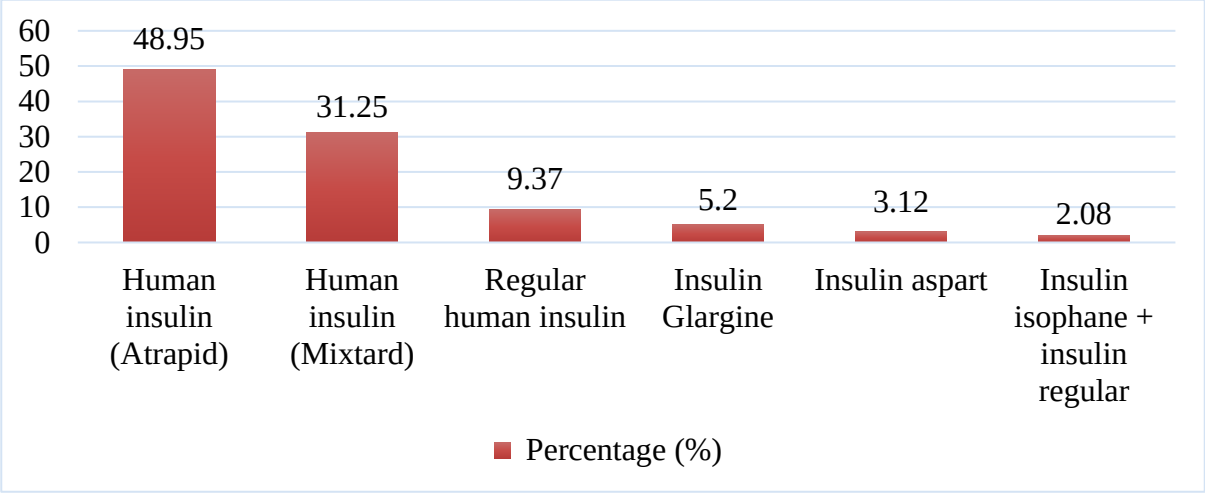

Figure 3: Percentage of different insulin Prescribed

Drugs used in the management of thyroid dysfunction: Thyroid dysfunctions were treated with oral medication in which levothyroxine (73.9%) for hypothyroidism and carbimazole (7.2%) for hyperthyroidism were the choice of drugs that was noticed to be prescribed in the study population.

Drugs used in the management of coexisting thyroid dysfunction in type II diabetes mellitus: 96.1% of patients were reported to have type II DM prior to the diagnosis of thyroid dysfunction, whereas 3.9% of the patients were diagnosed later as type II DM. The details are referenced in table 5.

Table 5: Coexistent of thyroid dysfunction in type II diabetes mellitus

Sl. No	Coexistent of thyroid dysfunction in type II diabetes mellitus	Percentage (%)
1.	Type II DM prior to thyroid dysfunction	96.1
2.	Type II DM post to thyroid dysfunction	3.9
	Total	100

DISCUSSION:

This study assessed the clinical details of 180 patients presented with both type II diabetes mellitus and thyroid dysfunction. The frequency of disease was higher among female than males which was consistent with the studies conducted by Demitrost et al. These reports suggest that female gender with type II diabetes mellitus will have the highest possibility of developing thyroid dysfunctions.8

The current study reports that the highest frequency of patients was in the age group of 60-69 years (38.33%) followed by the age group of 50-59 years (29.44%). The mean age of the study population was found to be 58.44 ± 10.55 years. Similar results

were seen in the studies carried out by Al-Sumry et al., in which mean age was 58.14 ± 12.27.9

Among these study subjects, majority of the patients shows the duration of type II diabetes for a period of 1-5 years. Comparable results were found in a study conducted by Sreelatha et al., where the majority of cases had type II diabetes mellitus for duration up to 5 years.10 Whereas in a study conducted by Subekti et al., reported that majority of the patients had type II diabetes mellitus for more than 10 years.11

Among 180 patients 100 patients were reported to have type II diabetes mellitus for a period of 1-5 years before the diagnosis of thyroid dysfunction followed by 34 patients for a period of 5 to 10 years. This finding were found in the study conducted by Ravi Shankar et al., where they reported higher frequency of hypothyroidism for a duration of 0-5 years followed by 6-10 years from the onset of type 2 diabetes mellitus.12

Among the subjects, there were 122 female patients and 58 male patients. Thyroid dysfunctions in type II diabetes mellitus showed the highest frequency of hypothyroidism in females (50%) and 24.44% in males. Male showed 2.77% in both hyperthyroidism and subclinical hypothyroidism. These reports were inconsistent with study conducted by Madavaram et al., which shows highest prevalence of females with subclinical hypothyroidism (22%) and hypothyroidism (14%). While among male's subclinical hypothyroidism was observed among (8%), hypothyroidism in (2%) and hyperthyroidism in (12%) of the study population.10

In present study OHA were the choice of medications for management of type II diabetes mellitus as it is considered as the safest drug in that no clinically relevant pharmacologic interactions have been described which was consistent with the study conducted by Subekti et al.11

Metformin was the most commonly prescribed oral hypoglycaemic agents (37.5%) followed by insulin, where human actrapid (48.95%) was the frequently prescribed drug. A related article by Wang et al., suggests that there is significant reduction of thyroid stimulating hormone level in euthyroid patients on levothyroxine substitution and subclinical hypothyroid patients who have not received levothyroxine treatment, except in euthyroid patients after 1 year on metformin.13

The study reports that 96.1% had type II diabetes mellitus prior to the diagnosis of thyroid dysfunction which is similar to the study conducted by Witting et al. It suggests that thyroid dysfunction is usually diagnosed after the onset of type II diabetes mellitus.14

CONCLUSION:

Thyroid dysfunction in type II DM showed highest occurrence among female patients in the age group of 60-69. It was found that significant numbers of the patients were reported to have type II diabetes mellitus for a period of 1-5 years before the diagnosis of thyroid dysfunction. So routinely investigation on thyroid functioning is essential in all type II DM patient for early identification and treatment of thyroid dysfunction and to delay the complications of diabetes.

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