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Evaluation of Thyroid Function in Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Thyroid disorders and diabetes mellitus are the two most common endocrinopathies encountered in clinical practice. Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to complete or relative deficiency of insulin. Diabetes mellitus is a major endocrine disorder worldwide in clinical practice. Despite of advances in treatment a large group of patients present with complications because of poor glycaemic control. The prevalence of Thyroid disorder in our study was 24.25% of which Sub-clinical hypothyroidism was 53.61%, followed by hypothyroidism 30.93%, followed by sub-clinical hyperthyroidism 11.34% and hyperthyroidism 4.12% in type 2 diabetic patients. The prevalence of sub clinical hypothyroidism was highest in the thyroid disorders in the study. The prevalence of thyroid disorder was more in females as compared to males in the study.

Keywords: Thyroid, Diabetes mellitus, Disorders, Clinical, Hypothyroidism

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INTRODUCTION

Thyroid disorders and diabetes mellitus are the two most common endocrinopathies encountered in clinical practice. Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to complete or relative deficiency of insulin.[1]

Thyroid disorders (TD) are widely common with variable prevalence in different population. Hypothyroidism and Hyperthyroidism are the two entities with vast difference in patho-physiology as well as clinical picture.

Thyroid hormones have large effects in modifying glucose metabolism and as a proof of above said concepts, most diabetics have to adjust their insulin requirements when overt thyrotoxicosis or hypothyroidism ensues. Prompt therapeutic intervention of thyroid dysfunction–succeeds–in reverting the metabolic decompensation. However, since diabetes has turned into an epidemic disease the focus is nowadays, directed towards the possible interaction between frequent forms of sub-clinical thyroid disease and insulin resistance.[2]

We intend to take this study in order to establish the possible relationship between Type 2 diabetes mellitus and thyroid function and in turn how thyroid disorders if present, influence the control of type 2 diabetes mellitus and glucose metabolism.

AIM AND OBJECTIVES

Aim

To evaluate thyroid function in patients with type 2 Diabetes mellitus

Objectives

To study the relationship between Type 2 diabetes mellitus and thyroid function. To know the prevalence of thyroid function in Type 2 diabetic patients. To estimate the need for annual screening of thyroid profile in Type 2 diabetic patients.

REVIEW OF LITERATURE

Diabetes Mellitus is the leading cause of end-stage renal failure, non-traumatic lower extremity amputations and adult blindness, which predisposes to cardiovascular disease. Given the rising prevalence of diabetes mellitus worldwide, it is expected to be the leading cause of morbidity and mortality in the future.

Mortality

The report indicates that 1.5 million deaths have occurred worldwide in 2012, rendering it the 8th leading cause of death and more than 80 per cent of diabetic deaths in low- and middle-income nations. More than 21 million live births were affected by diabetes during pregnancy and > 79,000 children developed type 1 diabetes in 2013.[3-9]

Type 2 Diabetes Mellitus is very common recognized structure of all diabetes, up to 80% to 95% and surrounds those people with insulin obstruction and accordingly has relative insulin deficiency.[10]

Thyroid Hormones

Thyroid hormone has an important role in various metabolic processes that are carbohydrate metabolism, lipid metabolism and pancreatic functions. Alteration of thyroid hormone levels directly affects the basal metabolic rate.[11]

The presence of Hyperthyoridism may affect diabetes control. Graves Disease is the commonest cause of hyperthyroidism. It has been noted that up to 50% of patients with Grave's disease develop variable glucose tolerance and in 2-3% of patients who were previously euglycemic may develop new onset frank DM due to hyperthyroidism.

Pre-existing diabetes mellitus may be aggravated, one cause being accelerated turnover of insulin.[12,13]

A prospective case control study was done by Kanhaiya Prasad et al in 2017, which comprised of 120 subjects, out of which there were 60 healthy persons who were categorized as controls and 60 patients suffering from type 2 diabetes mellitus categorized as cases. 23% of the patients in the case group were suffering from hypothyroidism, 10% of the patients with diabetes had hyperthyroidism and 40 were

euthyroid. The study concluded that there was very significant correlation between diabetes mellitus and thyroid dysfunctions.[26]

Ashraf Ahmed Ahmed et al in 2017 conducted a cross-sectional study on 369 type 2 Diabetes Mellitus patients, out which 9.5% had thyroid disorders, out of 9.5%,5.0% were sub-clinical hypothyroidism, 2.3% were hypothyroidism and 2.2% were hyperthyroidism.[15]

MATERIAL AND METHODS

Source of Data

The study was carried on patients with diagnosis of type 2 Diabetes mellitus who were admitted in medical wards and attending medical OPD in, Krishna Hospital, Karad during the study period of 18 months (1 October 2016 to 31 March 2018).

Study period

The present study was conducted from October 2016 to 31 March 2018.

Ethical clearance

Ethical clearance from college and university committee was taken. After ethical clearance, permission was taken from head of departments.

Data Collection

Patients were interviewed to obtain the demographic characteristics such as age and sex, presenting complaints, diabetic history and history of other co-morbidities. These patients were subjected to clinical examination and the findings including vitals and systemic examination findings were noted. These findings were recorded on a pre-designed and pretested proforma.

OBSERVATION AND RESULTS

Table 1: Distribution of patients based on duration of diabetes

Duration of Diabetes in years	Number (n)	Percent(%)
< 5	71	17.75
6-10	138	34.50
11-15	104	26.00
>15	87	21.75
Total	400	100
Chi square: 32.933; DF: 3; p value:<0.0001)		

The study had 138 (34.5%) number of patients who are suffering from diabetes since 6-10 years. There were 104(26%) patients who were suffering from diabetes since 11-15 years, followed by 87 (21.75%) patients who were suffering from the disease since >15 years and 71 (17.75%) who suffered since <5 years.

Table 2: Means of different study parameters

Tests	Mean ± Standard Deviation
HbA1C (%)	8.61 ± 1.82
FBS (mg/dl)	185.02 ± 77.0
T3 (ng/ml)	88.57 ±19.06
T4 (mcg / ml)	7.24 ± 2.25
TSH (IU /ml)	5.21 ± 10.45

In our study we studied means and standard deviations of different factors, the mean of HbA1C was found to be 8.61 ± 1.82. This is in the higher range which shows poor control of diabetes among the patients. The mean of fasting blood sugar was 185.02 ± 77.0 which is also higher which supports the finding of HbA1C. In the study the means of T3, T4 and TSH was 88.57± 19.06, 7.24 ± 2.25 and 5.21 ± 10.45 respectively.

Table 3: Distribution of patients based on HbA1c levels

HbA1c levels	Number (n)	Percent(%)
≤ 6.5	41	10.25
6.6 – 7.4	70	17.50
≥ 7.5	289	72.25
Total	400	100
(DF:2; p value<0.0001)		

The study had 359(89.75%) patients with poor glycaemic control with HbA1c levels above 6.6, which were further divided into HbA1c levels of 6.6 – 7.4 (17.50%) and ≥ 7.5 (72.25%). There were only 41(10.25%) who had levels <6.5 with good glycemic control.

Table 4: Thyroid profile of patients under the study

T3 levels in ng/dl	Number (n)	Percent(%)
< 80	30	7.5
80-158	366	91.5
>158	4	1
Total	400	100
(DF:2; p value:<0.0001)		
T4 levels in mcg	Number (n)	Percent (%)
< 4.9	30	7.5
4.9-11.0	366	91.5
>11.0	4	1
Total	400	100
(DF:2; p value:<0.0001)		
TSH level in IU/ml	Number (n)	Percent(%)
< 0.38	15	3.75
0.38-4.31	303	75.75
>4.31	82	20.5
Total	400	100
(DF:2; p value:<0.0001)		

Out of 400, 366 (91.5%) patients had T3 levels between 80-158 ng/dl. There were only 4 (1%) with raised (>158) levels of T3. The T4 level also had majority 366 (91.5%) between the levels of 4.9 – 11.0 mcg. Only 4(1%) had raised (>11) T4. The TSH levels showed derangement among 82(20.5%) patients and within normal range were 303(%) and less than 0.38 were 15(%3.75).

Table 5: Distribution of patients based on type thyroid disorder

Type of Thyroid disorder	Number (n)	Percent(%)
sub-clinical Hypothyroidism	52	53.61
Hypothyroidism	30	30.93
sub-clinical Hyperthyroidism	11	11.34
Hyperthyroidism	4	4.12
Total	97	100
(DF:3; pvalue:<0.0001)		

In our study, among the patients who had thyroid disorder, 52(53.6%) had sub-clinical hypothyroidism and 30(30.93%) had hypothyroidism. While 11(11.34%) had sub-clinical hyperthyroidism and 4(4.12%) had hyperthyroidism.

Table 6: Association of Thyroid disorder and Gender

Thyroid disorder and Gender	Males	Females	Total
Present	25 (25.77%)	72 (74.22%)	97 (100%)
Absent	188 (62.04%)	115 (37.95%)	303 (100%)
Total	213 (53.25%)	187 (46.75)	400 (100%)
Chi square: 38.83; DF:1; p value: < 0.0001(Highly Significant)			

In our study, we saw for association between thyroid disease and gender and we found that there was high significance between the associations. Females were seen to be having more thyroid disorders because of excess need and failure to fulfil the demand also.

DISCUSSION

Diabetes mellitus is a major endocrine disorder worldwide in clinical practice. Despite of advances in treatment a large group of patients present with complications because of poor glycaemic control. One of the factors that contribute to poor glycaemic control is thyroid dysfunction, which tends to occur concomitantly with diabetes mellitus. The Prevalence of both endocrinal diseases has become a point of attention in epidemiological studies since the last decade. This study sought to find out the prevalence of thyroid disorders in patients with type 2 diabetes mellitus. In this study out of 400 type 2 diabetic patients 24.25% had abnormal dysfunction while 75.75% had normal thyroid profile (T3, T4, TSH). The prevalence was seen to be higher as compared with Pranav kumar Raghuwanshi et al (prevalence of 8.8%), Imam Subekti et al (prevalence of 9.9%), Athanasia Papazafiropoulou et al (prevalence of 12.3%), Palma et al (prevalence of 14.7%), Ashok Khurana (prevalence of 16%), Anuradha Deuri et al (prevalence of 22.5%), Kanhaiya Prasad et al (prevalence of 23%); whereas

the prevalence was seen to be less as compared to C. E. J. Udiong et al (prevalence of 46.5%), Gurjeet Singh et al (prevalence of 30%),Palanisamy Pasupathi et al(prevalence of 28%), Ravishankar. S. N. et al (prevalence of 29%), Elmenshawi et al (prevalence of 29%), Ashish Sarode et al (prevalence of 29%) and Ajaz Ahmad et al studies (prevalence of 29%).[16-30]

Out of these 76 cases, majority were having sub-clinical hypothyroidism (52.26%), some were having frank hypothyroidism (30.26%), some were having sub-clinical hyperthyroidism (9.22%) and least were having frank hyperthyroidism (5.26%). Similar findings were seen in a study conducted by A.A. Telwani where most common disorder found was sub-clinical hypothyroidism and least was hyperthyroidism.[14]

CONCLUSION

The prevalence of Thyroid disorder in our study was 24.25% of which sub-clinical hypothyroidism was 53.61%, followed by hypothyroidism 30.93%, followed by sub-clinical hyperthyroidism 11.34% and hyperthyroidism 4.12% in type 2 diabetic patients. The prevalence of sub clinical hypothyroidism was highest in the thyroid disorders in the study. The prevalence of thyroid disorder was more in females as compared to males in the study. The maximum number of thyroid disorders is in between the age group of 40-60 years. Thyroid disorder is seen maximum in patients with the duration of 11- 15 years of type 2 diabetes mellitus. In the study we found a strong correlation between presence of thyroid dysfunction and uncontrolled diabetes mellitus (HbA1c>8%). The study population had an obvious Thyroid dysfunction; hence it is prudent to screen for or to ask for Thyroid profile in patients with type 2 Diabetic patients.

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