Original Research Article

Evaluation of thyroid function in patients with type 2 diabetes mellitus

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Abstract

Background: Thyroid disorders and diabetes mellitus are the two most common endocrinopathies encountered in clinical practice. We intended to take up this study in order to establish the possible relationship between Type 2 diabetes mellitus and thyroid disorder. **Methods:** The study was carried on patients with diagnosis of Type 2 diabetes mellitus who were admitted in medical wards and attending medical OPD in the department of medicine, Krishna Hospital, Karad during the study period of 1 October 2016 to 31 march 2018.It was an observational Cross-sectional study. Clinical data and laboratory reports were collected and compared for different age groups, gender and duration of diabetes mellitus and its correlation with thyroid disorder. **Results:** Out of total 400 patients studied, 97(24.25%) patients had thyroid disorder. Among the patients who had thyroid disorder, we had 52(53.6%) with subclinical hypothyroidism and 30(30.93%) who had hypothyroidism. There were 11(11.34%) who had subclinical hyperthyroid and 4(4.12%) who had frank hyperthyroidism. Both Clinical and Subclinical Hypothyroidism were found more in Females as compared to males and the association was found to be highly significant ($p < 0.0001$). Thyroid disease increased as there was increase in the age. **Conclusion:** Thyroid disorder is seen maximum in patients with the duration of 11-15 years of type 2 diabetes mellitus. 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.

Key Word: type 2 diabetes mellitus.

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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 caused by absolute or relative deficiency of insulin.[1] The thyroid gland produces two hormones, thyroxine (T4) and triiodothyronine (T3), acting through the thyroid hormone receptors α and β, these hormones play a major role in cell differentiation during development and help maintain thermogenic and metabolic homeostasis in adults.[1] Both conditions frequently coexist and many studies documented higher prevalence of thyroid dysfunction in patients with diabetes in general population than normal prevalence of thyroid dysfunction in non-diabetic population.[2] The association between diabetes and thyroid dysfunction was seen since long. It was first published in 1979. How Thyroid hormones affect glucose metabolism via several mechanisms in diabetes, is a matter of investigation.[3] There has been estimated that prevalence of thyroid dysfunction among diabetes patients varies with range from 2.2 to 17%, however, few studies also have estimated high prevalence of thyroid dysfunction in diabetes up to 46.5%. We intended to take up this study in order to establish the possible relationship between Type 2 diabetes mellitus and thyroid disorder.

AIM AND OBJECTIVES

- The study was undertaken with an aim of studying the relationship between Type 2 diabetes mellitus and thyroid disorders.

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- Objectives were to know the prevalence of thyroid disorders in Type 2 diabetic patients and to estimate the need for annual screening of thyroid profile in Type 2 diabetic patients.

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 the department of medicine, Krishna Hospital, Karad during the study period of 1 October 2016 to 31 March 2018. It was an observational cross-sectional study. Total 400 patients with diagnosis of type 2 diabetes mellitus were included in the study with age more than 18 years. Patients who are previously diagnosed as cases of Type 1 diabetes mellitus, those with chronic illness were excluded.

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

Informed written consent of the participants was taken and data was collected.

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 predesigned and pretested Performa.

Statistical analysis: Data was analysed for mean, percentage, standard deviation, chi square test, multiple correlation and multivariate analysis, by using SPSS-10(Statistical Package for the Social Sciences) for Windows (SPSS, Chicago, IL).

RESULT

The study had 97(24.25%) patients who had thyroid disorder and there were 303(75.75%) who had no thyroid disorder.

Table 1: Distribution of patients based on thyroid disease

Thyroid Disorders	Number n	Percentage %
Present	97	24.25
Absent	303	75.75
Total	400	100

(DF:1; p value:<0.0001)

In our study, among the patients who had thyroid disorder, we had 52(53.6%) with subclinical hypothyroidism and 30(30.93%) who had hypothyroidism. There were 11(11.34%) who had subclinical hyperthyroid and 4(4.12%) who had frank hyperthyroidism.

Table 2: Distribution of patients based on type thyroid disorder

Type of Thyroid disorder	Number	Percentage %
Subclinical Hypothyroidism	52	53.61
Hypothyroidism	30	30.93
Subclinical Hyperthyroidism	11	11.34
Hyperthyroidism	4	4.12
Total	97	100

(DF:3; p value:<0.0001)

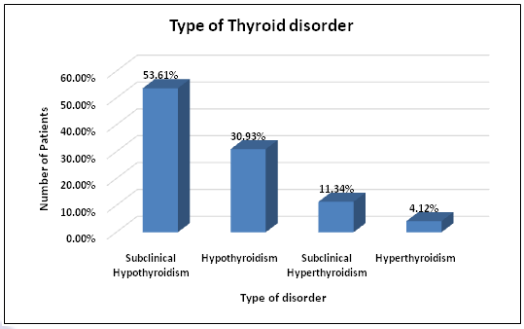

Figure 1: Type of Thyroid disorder

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

Table 3: Association of Thyroid disorder and Gender.

Thyroid disorder and Gender	Males	Females	Total
Present	25	72	97
Absent	188	115	303
Total	213	187	400

$X^2 = 38.83$, $p < 0.0001$ (Highly Significant)

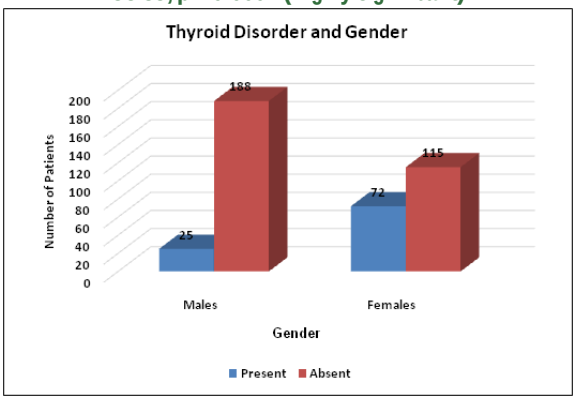

Figure 2: Association of Thyroid disorder and Gender

Both Clinical and Subclinical Hypothyroidism were found more in Females as compared to males and the association was found to be highly significant ($p < 0.0001$).

Table 4: Association of Gender and Hypothyroidism (primary and Subclinical)

Gender and Hypothyroidism (Clinical and Subclinical)	Hypothyroidism (TSH > 4.31)	No Hypothyroidism (TSH ≤ 4.31)	Total
Males	22	191	213
Females	60	127	187
Total	82	303	400

$X^2 = 28.92$, $p < 0.0001$

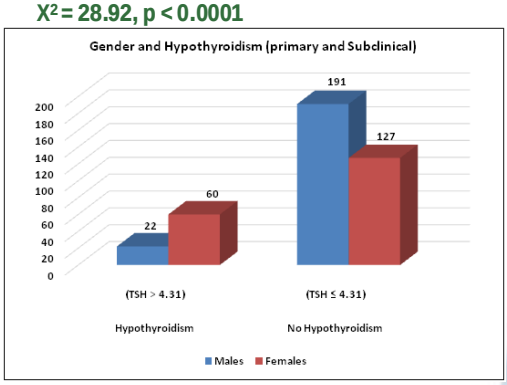

Figure 3: Association of Gender and Hypothyroidism (primary and Subclinical)

In the study we were able to see significant association between the thyroid disorders and age group too. Thyroid disease increased as there was increase in the age. This could be due to the failure of body's mechanism to compensate for the losses and

Table 1: Association of Thyroid disorder and age

Thyroid disorder and Age groups	<40	40 - 60	>60	Total
Present	8	68	21	97
Absent	79	149	75	303
Total	87	217	96	400

$X^2 = 16.96$, $p = 0.0002$

Efficient production of the hormone. In our study we had significant association between duration of diabetes and thyroid disorder, as there was increase in duration of diabetes, there was increase in the thyroid disorder percentage.

Table 6: Association of Thyroid disorder and duration of diabetes

Thyroid disorder and Duration of Diabetes	< 5	6 - 10	11 - 15	>15	Total
Present	14	23	31	29	97
Absent	57	115	73	58	303
Total	71	138	104	87	400

$X^2 = 10.77$, $p = 0.013$

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 an 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 high 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 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%).[4-18] In the study out of 24.25%, 53.61% were subclinical hypothyroidism, 30.93% were hypothyroidism, 11.34% subclinical hyperthyroidism, 4.12% were hyperthyroidism of type 2 diabetic patients. Udiong *et al* study 26.6% had low thyroid hormone levels, if we compared to our study only 7.5% had low thyroid levels, while hyperthyroidism was seen in 19.9% diabetic population which is high as to our study. There is no evidence of subclinical hypothyroidism and hyperthyroidism in C.E.J. Udiong study which is seen in our current study.[4] Pranav Kumar Raghuwanshi *et al* study which had hypothyroidism and subclinical hypothyroidism found to be 4(10.00%) and6 (15.00%) respectively and subclinical hyperthyroidism and hyperthyroidism found to be 0(0.0%) and 1(2.5%) respectively which was very low compared to our current study.[11] In our study, we saw for association between thyroid disease and gender, we found that there was high significance between the association. Females were seen to be having more thyroid disorders because of excess need and failure to fulfil the demand. The findings are found to be similar to the study by Ashok Khurana *et al*,[12]Ajaz Ahmad *et al*,[17]Ashish Sarode *et al*,[16] Elmenshawi *et al*,[15] Kanhaiya Prasad *et al*,[62]and Anuradha Deuri *et al*.[61] In the study we were able to see significant association between the thyroid disorders and age group. Thyroid disease increased as there is increase in the age group seen in Ashok Khurana *et al*,[60] Anuradha Deuri *et al*,[61] Kanhaiya Prasad *et al*,[14]Elmenshawi *et al* [15]studies, but

in our study we have high thyroid disorder in age group of 40-60 years. This could be due to the failure of body's mechanism to compensate for the losses and efficient production of the hormone.Also with increasing prevalence of diabetes, even the younger populations are having more deranged blood sugars, low glycemic control and thus its complications like thyroid disorders.[12,15,18] We also found that females are maximum in this age group (40-60 years), the most common thyroid disorder was hypothyroidism (primary, subclinical) this can be due to low estrogen levels due to menopause which causes low iodine absorption and altered liver function.

Table 7: Comparison of prevalence of different studies

Studies	Year	Prevalence
C. E. J. Udiong *et al*[19]	2007	46.5%
PalanisamyPasupathi *et al*[20]	2008	28%
Athanasia Papazafiropoulou *et al*[21]	2010	12.3%
Gurjeet Singh *et al*[22]	2011	30 %
VinuVij *et al*[23]	2012	28.75%
Ravishankar, S. N. *et al*[24]	2013	29%
Palma *et al*[25]	2013	14.7%
Pranav Kumar Raghuwanshi *et al*	2014	8.8%
Ashok Khurana	2015	16%
Anuradha Deuri *et al*	2016	22.5%
Kanhaiya Prasad *et al*	2017	23%
Elmenshawi *et al*	2017	29%
Ashish Sarode *et al*	2017	29%
Ajaz Ahmad *et al*	2017	29%
Imam Subekti *et al*	2017	9.9%
Ashraf Ahmed Ahmed *et al*	2017	9.5%
Current study	2018	24.25%

The prevalence of Thyroid disorder in our study was 24.25% of which Subclinical hypothyroidism was 53.61%, followed hypothyroidism 30.93%, followed by subclinical hyperthyroidism 11.34% and hyperthyroidism 4.12% in type 2 diabetic patients.

CONCLUSION

In our study we found prevalence of thyroid disorder was 24.25% in type 2 Diabetes mellitus patients. The maximum numbers of patients in the study were between 40-60 years. Males outnumbered females in the study but the prevalence of thyroid disorder was more in females as compared to males. Of the all thyroid disorders, the prevalence of subclinical hypothyroidism was highest in the thyroid disorders in our study. Thyroid disorder were seen maximum in patients with the duration of 11-15 years of type 2 diabetes mellitus. 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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