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INCIDENCE AND RISK FACTORS OF THYROID DYSFUNCTION ASSOCIATED WITH TYPE II DIABETES MELLITUS

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ABSTRACT

Diabetes mellitus (Type II) and hypothyroidism are chronic diseases which frequently require lifelong summarize and treatment. Both the diseases have long lasting effects on direct cardiovascular risk factors like hyperlipidemia and hypertension. This study focused on Incidence and risk factors of thyroid dysfunction associated with type II diabetes mellitus. A total number of 400 subjects were recruited from consenting persons with T2DM in the Diabetes Clinic and Medical Wards of the Surabhi Institute of Medical Sciences, Telangana, India.. For every three study subjects selected, one consenting person who did not have DM was recruited from the out-patients clinics and other parts of the hospital to serve as the control. Females formed the majority of the study population accounting for 77.9%of the type 2 DM patients and 49% of the controls. The majority of the participants were Retirees (44.6%) followed by Civil servants (25.7%) formed. Tertiary education (27.5%) and Greater parts of the participants (65.3%) were married. This examine indicates that a great proportion of kind 2 diabetes patients be afflicted by clinical or subclinical hypothyroidism and screening for the equal can be suitable.

Keywords :- Thyroid disorders, Thyroid stimulating hormone, Type 2 diabetes mellitus, hyperlipidemia.

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INTRODUCTION

Diabetes mellitus (Type II) and hypothyroidism are chronic diseases which frequently require lifelong summarize and treatment. Both the diseases have long lasting effects on direct cardiovascular risk factors like hyperlipidemia and hypertension.[1] T2D is due to insulin resistance associated with insulin deficiency, which may result in carbohydrate derangement and hyperglycemia.[2] Long-term hyperglycemia may cause various acute and chronic complications and is the leading cause of blindness, cardiovascular disease, renal failure, and even death.[3] It is not only a big challenge in the clinical setting but also a heavy burden for public health.

Thyroid hormone is a major regulator of metabolism and energy outflow, is directly involved in the control of insulin secretion and glucose homeostasis and has been shown to preserve beta-cell viability and proliferation. Hyperthyroid individuals have an increased insulin secretion and higher free triiodothyronine levels are specifically associated with improved insulin secretion in individuals with pre-diabetes.[4]However, the deleterious effect of thyrotoxicosis on glucose metabolis.

Both type 2 diabetes and hypothyroidism may be managed well in nearly all patients to result in normalization of blood glucose degrees and thyroid hormone degrees which can also lessen the morbidity of these conditions. India is the diabetes capital of the world with the disease estimated to affect 6.5 to 19.5% of the adult Indians.[5]

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The situation is worse in the South Indian state of Kerala where the prevalence is the maximum among all Indian states.[6] The relation between diabetes and thyroid dysfunction has been studied by various researchers and the prevalence of hypothyroidism among patients with diabetes is reported from 4.8 to 31.4%.[7] Prevalence of hypothyroidism in India is around 11%.

South Indians have elevated thyroid-peroxidase antibody levels in around 9.5% of general population.There is paucity of large studies from India which have looked into the prevalence of thyroid disorders in patients with diabetes mellitus.Throughout this retrospective Incidence and risk factors of thyroid dysfunction associated with type II diabetes mellitus.

MATERIAL AND METHODS

The study was conducted at the Surabhi Institute of Medical Sciences, Telangana, India.. This is a descriptive cross-sectional study involving patients with T2DM attending the Diabetes. A total number of 400 subjects were recruited from consenting persons with T2DM in the Diabetes Clinic and Medical Wards of the Surabhi Institute of Medical Sciences, Telangana, India.. For every three study subjects selected, one consenting person who did not have DM was recruited from the out-patients clinics and other parts of the hospital to serve as the control.

Screening for DM was done in controls using the random blood glucose (RBG). Those with RBG of <11.1 mmol/l, had no classic symptoms of hyperglycaemia and were not on any hypoglycemic medications were accepted as controls. The inclusion criteria include.

Exclusion criteria included: Those with history of neck trauma or surgery, Pregnant women, Subjects with history of previous exposure of radiation in the neck, Non-consenting patients, Patients <40 years of age at diagnosis of DM, Patients on drugs like amiodarone, lithium, interferon alpha, iodides, beta blockers, carbimazole, propylthiouracil, potassium iodide, lugol's iodine. Ethical approval was obtained from college Written informed consent was obtained from all subjects participating in the study.

Diagnosis of Diabetes mellitus

All the participants had their blood glucose estimated using the Accu-chek Active glucometer. The patients with type 2 DM had their urine samples tested for presence of urinary protein (albumin) using Combi-3 urinary strips from Medi-Test, Germany. The presence of one+and above of urine albumin was taken to be positive for albuminuria.

Glycated hemoglobin (HbA1c) was estimated using the In-2-it HbA1c device from BIO-RAD Laboratories Flintshire UK. It involves the use of boronate affinity chromatography to separate the glycated fraction from the non-glycated fraction.[7]It measures the HbA1c level which reflects the average blood glucose level over the previous 2 or 3 months.

Glycaemic control was assessed with the values of the HbA1c. HbA1c value was used to categorize the DM patients into two groups: good glycaemic control (HbA1c<7%), and poor glycaemic control (HbA1c≥7%) (37).

Diagnosis of thyroid dysfunction

Participants with raised TSH, and low fT3 and fT4 were regarded to have primary hypothyroidism; those that had elevated TSH, but with normal fT3 and fT4 were taken to have subclinical hypothyroidism.[8] In the same vein, those who had low TSH, and high fT3 and fT4 were regarded to have primary hyperthyroidism; those that had low TSH but with normal fT3, and fT4 were taken to have subclinical hyperthyroidism.[9] While the subjects with low or normal TSH, but had low fT3 and fT4 were taken to have secondary hypothyroidism.[9] Frozen sera from the T2DM subjects and controls were thawed and allowed to attain room temperature. The samples were assayed for free T3, free T4, and TSH, respectively in batches, in three runs, each on a different day. Control samples provided in the reagents kits were analyzed with each run of the analytes following the manufacturer's instructions.

The data generated from the study was analyzed using the Statistical Package for the Social Sciences (SPSS) IBM version 17. A statistical comparison was made with the student t-test for quantitative variables like weight, height, blood pressure, serum TSH, serum T3; while Chi-square test was used for comparison of proportions. A $p < 0.05$ was taken as being statistically significant.

RESULTS

A total of 400 subjects were studied. Complete data for analysis was available for 382 subjects. Three hundred and forty five (345) of them were patients with type 2DM, while 37 subjects who did not have type 2 DM served as the controls.

Table 1:Socio-demographic characteristics of study participants.

	Total (n-400)	T2DM(n-345)	Controls(37)	p-valvue
Gender				
Female	225(56.2%)	220(63.7%)	17(45.9%)	0.25
Male	175(43.7%)	125(36.2%)	20(54%)	
Occupation				
Trades	64(16%)	21(6%)	3(8.1%)	0.16
Civil Servants	152(38%)	89(25.7%)	2(5.4%)	
Private sectors	75(18.7%)	56(16.2%)	9(24.3%)	
students	21(5.25%)	25(7.2%)	6(16.2%)	
Retirees/No employment	88(22%)	154(44.6%)	17(45.9%)	
Educational status				
None	135(33.7%)	102(29.5%)	25(67.5%)	0.86
1^0Education	120(30%)	89(25.7%)	3(8.1%)	
2^0 Education	46(11.5%)	59(17.1%)	7(18.9%)	
3^0 Education	99(24.7%)	95(27.5%)	2(5.4%)	
Marital status				
Single	11(2.75%)	10(2.5%)	7(18.9%)	0.87
Married	315(78.5%)	295(85.5%)	19(51.3%)	
widowed	74(18.5%)	40(11.5%)	11(40.7%)	
Family history of DM				
Yes	173(43.2%)	149(43.1%)	26(70.2%)	
No	227(56.7%)	196(56.8%)	11(29.7%)	

Females formed the majority of the study population accounting for 77.9%of the type 2 DM patients and 49% of the controls. The majority of the participants were Retirees (44.6%) followed by Civil servants (25.7%) formed. Tertiary education (27.5%)and Greater parts of the participants (65.3%) were married.

Table 2: Clinical characteristics of study participants

	T2DM patients(n=345)	Controls (37)	P value
Mean age	54.7	37.7	0.15
BMI (kg/m2)	24.6	16.2	0.001*
Waist circumference (cm)	86.5	52.5	0.03
Weight (kg)	71.0	39.1	0.04*
Height (m)	1.69	1.56	0.75
Systolic BP (mmHg)	125.6	126.5	0.15
Diastolic BP (mmHg)	71.5	79.2	0.13

The mean age of the T2DM patients in this study was 54.7(±7.7) years, while the controls had a similar mean age of 37.7 (±5.2) (p = 0.17). The mean age at diagnosis of DM was 54±7.6 years. The mean duration of DM for all the T2DM patients was 6.5±2.8 years.T2DMpatients had higher means BMI than the controls (24.6± 4.0 vs. 16.2 • ±2.8).

Table 3: The relationship between the presence of DM complications and thyroid dysfunction

DM complications	Thyroid dysfunction Yes (n=44)	Thyroid dysfunction No(n=301)	*P value*
Retinopathy	42(95.4%)	156	0.32
nephropathy	35(79.5%)	30	0.001
Peripheral neuropathy	31(70.4%)	162	0.75
Dm foot Ulcer	22(50%)	63	0.26

The type 2 DM patients in this study had the following chronic complications of DM: DM foot ulcer (95.4%) retinopathy (79.5%), peripheral neuropathy (70.4%) and DM nephropathy (50%)

Table 4: Univariate analysis of the possible risk factors of thyroid dysfunction

Variable	Thyroid dysfunction Yes (n=44)	Thyroid dysfunction No(n=301)	*P value*
Gender			**0.001**
Male	21	159	
Female	23	142	
Age			**0.71**
<60	15	106	
>60	29	195	
Duration of DM			**0.005**
≤5	19(43%)	176	
>5	25(56.8%)	125	
HbA1c (%)			**0.04***
<7	20	135	
≥7	24	166	
Hypertension		**0.42**	
yes	24	169	
No	20	132	
Central obesity			**0.001***
Yes	32	95	
No	12	206	
Retinopathy			**0.25**
Yes	17	30	
No	27	271	
Nephropathy		**0.005***	
Yes	19	157	
No	25	144	
Peripheral neuropathy		**0.76**	
Yes	21	155	
No	23	146	
DM foot Ulcer		**0.31**	
Yes	7	67	
No	37	234	

DISCUSSION

In present study Females formed 56.2% of the patients. Females also constituted 63.7% of the type 2 DM patients. This study correlated with the Diabcare Nigeria study group in 2012.[10] Ofoegbu et al.[11] reported a mean age of (59.2)years and Okafor et al.[12] in Enugu reported(55.7) years as the mean age of type 2 DM patients they evaluated for cardio-metabolic risk factors is similar to the reported by in this study (54.7) may be due to the fact that the prevalence of type 2 DM increases with age.

Diabetic retinopathy was observed in 95.4% of the type 2 DM patients in present study. This is higher than Ashaye et al. (42.1%).[13] it can be attributed to the increasing prevalence of DM retinopathy. Ugoya et al., [14] (75%) of reported by incidence of peripheral neuropathy this report similar to our study.(70.4%)

Diabetic nephropathy was observed in 75.9% of the patients with type 2 DM in this study which is correlated with 72.6% reported by Onovughakpo-Sakpa et al.[15]Diabetic nephropathy was the only microvascular complication of DM that has a significant relationship with the presence of thyroid and had a strong association with thyroid dysfunction. This agrees with the report of Oputa RN et al., [16] that hypothyroidism is a risk factor for nephropathy.

Usually females who had type 2 DM were four times more likely to develop thyroid dysfunction than their male counterparts. This report showed that predominance of thyroid disorders were more in females as compared to males. These results are also consistent with Michalek AM,et al.[17] Accordingly, the prevalence of thyroid disorders in diabetic patients is influenced by female gender.

Abnormal waist circumference was significantly associated with thyroid dysfunction. This is similar to the report by Biondi et al.[18] also found associations between thyroid dysfunction and obesity in the metabolic syndrome. This may be as a result of the link among obesity and leptin. It is known to be an important neuro-endocrine regulator of the hypothalamo-pituitary-thyroid axis by regulating TRH gene expression in the paraventricular nucleus. Iodine deficiency, autoimmune thyroiditis and mutations in the TSH receptor genes are some of the other speculation put forward to explain the affiliation between growing TSH, weight problems and subclinical hypothyrodism in some populations

This study showed that type 2DM patients with elevated HbA1c were 5 times more likely to develop thyroid dysfunction than their counterparts with good glycaemic control (HbA1c<7%). It is may be adverse effects of chronic hyperglycaemia on the hypothalamo-pituitary axis where it blunts or abolishes the nocturnal TSH peak. Bazrafshan et al.[19] in his study found a significant correlation between HbA1c levels and TSH levels which is correlated with the our results.

Our study reported that DM duration >5 years was a risk factor for thyroid dysfunction. This is probably an indication that growing period of DM can be a hazard aspect in the prevalence of thyroid disorder as continual hyperglycaemia impairs the peripheral deiodination of T4 to T3 main to thyroid disorder. Which is correlated with Telwani et al.[20]

Stanley U. et al., study finding relationship between thyroid disorders was significantly more in diabetics with duration of diabetes = 5 years as compared to duration < 5 years. This is similar to our study.

CONCLUSION

Clinical hypothyroidism is seen in around 1/10 of Indian patients with type 2 diabetes.. The presence of hypothyroidism in diabetic patients may be suggested by presence of female sex, hyperlipidemia, higher duration of diabetes, obese status, presence of anemia and also diabetic mellitus nephropathy were risk factors of thyroid dysfunction in type 2 DM patients in current study.

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