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Original Research Article

Assessment of thyroid Function in Diabetes Mellitus (middle & old population) at Western UP

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ABSTRACT

Background: Diabetes mellitus (DM) and thyroid dysfunctions are the two most common endocrine disorders to come across in any clinical practice. Both thyroid hormones and insulin act antagonistically in metabolic pathways or cycles of cells. The aim of our study is to look for thyroid dysfunction in patients with type 2 DM and its correlation with insulin resistance (IR).

Materials and Methods: A cross-sectional study was carried out among 325 diagnosed type 2 diabetic patients. Thyroid stimulating hormone (TSH), free triiodothyronine, free thyroxine, and insulin were measured in fasting serum sample.

Results: 325 study subjects majority 50.8% (165) belongs to age group 41-50 years followed by 28.3%(92) belongs to age group 51 -60 years while least subjects 0.9%(3) belongs to age group more than 80 years. 325 study subjects majority 58.5 %(190) were female while rest 41.5% (153) were male. Subjects maximum 165(50.8%) have TSH level <4.60 micro IU/ml followed by 154 (47.9%) study subjects who have TSH level between 4.66-10microIU/ml and only 6 participants have TSH level more then 10microIU/

Conclusion : The relationship between diabetes mellitus and thyroid disorders is characterized by a complex interdependent interaction. Unidentified thyroid dysfunction could negatively impact diabetes and its complications and may be one of the prime causes of poor management of type 2 DM. Therefore, there is a need for routine assay of thyroid hormones in type 2 diabetic patients to improve the medical management as well as to reduce the morbidity in them.

1. Introduction

Type 2 diabetes and thyroid disorders are the two most common endocrine diseases to be recognized in clinical practice. Thyroid hormones are found to influence almost all the metabolic pathways including carbohydrate metabolism. On the other hand, in type 2 DM, there are variable degrees of insulin resistance (IR) and/or impaired insulin secretion and increased glucose production. Hence, there is derangement of metabolism, especially the carbohydrate in both the conditions that are in thyroid disorders and type 2 DM.[1–3]

Thyroid hormones and insulin both are involved in cellular metabolism antagonistically. Therefore, excess or deficit of any one of them may result in metabolic derangement.[3]

Recently, interest has been raised for the influence of thyroid hormone action on insulin levels. Conflicting data are available on influence of insulin levels on thyroid dysfunction. The development of IR may also lead to many metabolic abnormalities.[4]

Various studies have reported different prevalence rates of thyroid hormone disorders in type 2 diabetes. Compared to normal population, diabetic patients have higher prevalence of thyroid disorder, with hypothyroidism being the most common disorder. In areas with endemic goiter, iodine deficiency is the major cause of hypothyroidism. Since the prevalence rate of hypo- or hyperthyroidism in various parts of the world differed, the prevalence rates of thyroid dysfunction in diabetes still remain

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controversial. Unidentified thyroid dysfunction may alter the metabolic controls in patients with diabetes and may also exaggerate already existing cardiovascular risk. Recognition and treatment of thyroid disorder in patients with diabetes may benefit glycemic control, attenuate cardiovascular risk, and improve general well-being. [5]

Aim of study

1. To study the relationship between Diabetes mellitus and Thyroid function
2. To find out thyroid dysfunction in the patient of diabetes mellitus
3. Evaluation of clinic-epidemiological correlation with thyroid dysfunction & diabetes mellitus
4. Find out burden of hypothyroidism/hyperthyroidism associated with diabetes mellitus.

2. Material and Methods

2.1. Study area

All patients with diagnosis of diabetes mellitus, attending Sarawathi Institute of Medical Sciences , NH-24 , Pilkhuwa , Hapur , Uttar Pradesh , taken as cases in the study.

2.2. Study design

Cross Sectional Study.

2.3. Study population

Diabetes patients newly registered at the OPD/IPD of Sarawathi Institute of Medical Sciences , NH-24 , Pilkhuwa, Hapur, Uttar Pradesh.

2.4. Sample size

Selection of 325 patients

2.5. Study tools

Pre designed semi-structured questionnaire

2.6. Study periods

Data collection period: - July 2018 to July 2019.

Data collected for a period of 12 MONTH during OPD time.

2.7. Inclusion criteria

1. All patients of both genders with diagnosis of Diabetes mellitus Type 2 on the basis ADA criteria for diabetes 2019.
2. Patient's age should be more than 40 years.

2.8. Exclusion criteria

1. Patients who are under intensive care
2. Other forms of diabetes mellitus

3. Results

Table 1: Distribution of Study Population Accordingto Age and Sex (N=325)

Socio demographic characterstics		Study Population	
		No	%
Age (years)	41 years -50 years	165	50.8%
	51 years -60 years	92	28.3%
	61 yeas -70 years	50	15.4%
	71 year5s –80 years	15	4.6%
	>80 years	3	0.9%
Sex	Male	135	41.5%
	Female	190	58.5%

Table 1 Shows that out of 325 study subjects majority 50.8% (165) belongs to age group 41-50 years followed by 28.3%(92) belongs to age group 51 -60 years while least subjects 0.9%(3) belongs to age group more than 80 years. This table also shows that out of 325 study subjects majority 58.5 %(190) were female while rest 41.5% (153) were male

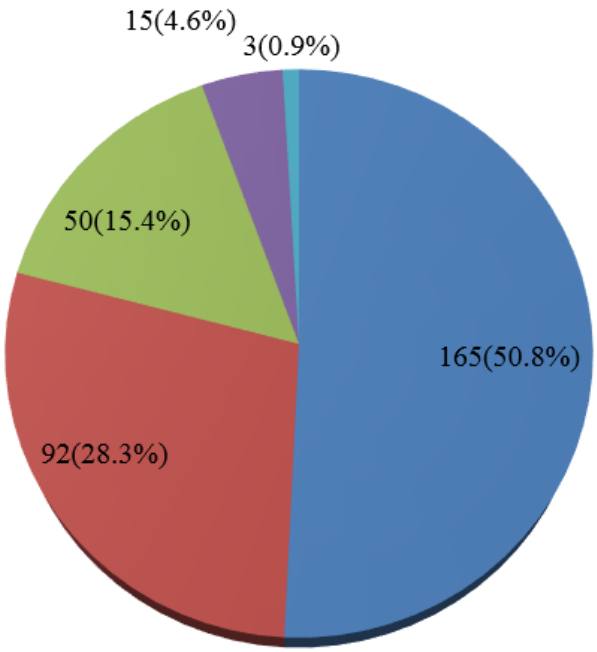

Fig. 1: Distribution of study Population According to Age (N=325)

Figure 1 Shows that out of 325 study subjects majority 50.8% (165) belongs to age group 41-50 years followed by 28.3%(92) belongs to age group 51 -60 years while least subjects 0.9%(3) belongs to age group more than 80 years.

Figure 2 also shows that out of 325 study subjects majority 58.5%(190) were female while rest 41.5% (153) were male.

Table 2: Distribution of Study Population According to association of Age with HbA1CLevel(N=325)

Age	HbA1C			Total	Significance
	6-7%	7.1- 8%	>8%		
41-50 years	34(20.6%)	62(37.57%)	**69(41.81%)**	165(100%)	
51-60 years	21(22.82%)	29(31.57%)	42(45.65%)	92(100%0	
61-70 years	12(24%)	21(42%)	17(34%)	50(100%)	X^2= 33.696 df =4
71-80 years	2(13.33%)	9(60%)	4(26.66%)	15(100%)	p<0.05
>80 years	0(0%)	1(33.33%)	2(66.66%)	3(100%)	
Total	69(21.33%)	122(37.53%)	134(41.23%)	325(100%)	

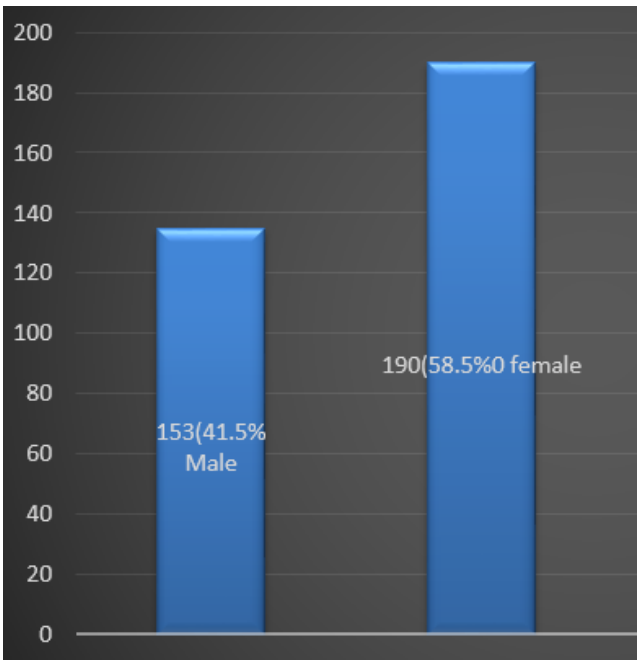

Fig. 2: Distribution of Study Population According to Sex (N=325)

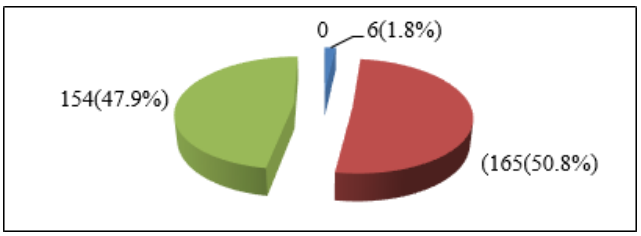

Fig. 3: Distribution of Study Subjects According to Their TSH level(N=325)

Table 2 describes distribution of study population according to association of age with glycosylated haemoglobin. This table shows that out of total 325 study subjects maximum 165(50.8%) were in age group of 41-50 years. Out of them maximum 41.81 %(69) study subjects have HbA1c level more than 8% followed by 37.57 %(62) have HbA1C level between 7.1-8% while only 34(20.6%) have Hba1c level between 6-7%. About 92 (28.3%) were in age group of 51-60 years out of then maximum 42 (45.655) have HbA1C level more than 8% This table also shows that only 3(0.9%) study subjects were in age group of more than 80 years and out of then 2(66.66%) have Hba1C level more than 8%.

This Table shows that among the study subjects maximum 165(50.8%) have TSH level <4.60 micro IU/ml followed by 154 (47.9%) study subjects who have TSH level between 4.66-10microIU/ml and only 6 participants have TSH level more then 10microIU/

4. Discussion

The study showed that the serum T3 and serum T4 levels were decreased, and serum TSH levels were increased in type 2 diabetics without any complications and type 2 diabetics with nephropathy when compared to controls. We have observed that there is no substantial change in the levels of serum T3, T4 and TSH among diabetics without complications and diabetics with nephropathy.[6] A study by Jusufovics S, et al. showed that patients with type 2 diabetes had abnormal thyroid hormone levels. The level of T3, T4, FT3, and FT4 were significantly lower while the levels of TSH were significantly higher in type 2 diabetics as compared to non-diabetics. Significantly higher levels of serum creatinine, glycated hemoglobin was observed in diabetics as compared to non-diabetics subjects who agree with the findings of our study.[7] A study by Mogensen CE, et al., showed that the levels of FT3 were significantly lower in type 2 diabetics when compared with the controls. FT4 and TSH did not show any statistically significant difference between type 2 diabetics and controls. The mean serum ratio of FT3/FT4 was significantly lower in type 2 diabetics than in the control group. Presence of hypothyroidism among diabetics when compared to controls has also been documented by Saha et al., In diabetes mellitus, there is the influence of endocrine and non-endocrine organs other than pancreas.[8] There are alterations in the hypothalamus-pituitary-thyroid axis. Hypothalamic and plasma TRH, pituitary and plasma TSH, as well as TSH secretion rates are reduced, and the TSH response to TRH is decreased. Despite normal peripheral TSH metabolism.T3 and T4 production and iodide uptake by the thyroid are diminished. There are important structural changes in the thyroid gland

and pituitary that are accompanied by marked alterations in their secretary activities. T4 deiodination to T3 in peripheral tissues is decreased.[9] Iodothyronines are insulin antagonist with high levels being diabetogenic, while the absence of the hormone inhibits the development of diabetes. These situations may prevail in diabetics and would be aggravated in poorly controlled diabetics. Stress, which is associated with diabetes, may also cause changes in the hypothalamus anterior-pituitary axis in a diabetic.In the present study, 8.3% (9) of the patients had report suggestive of subclinical hypothyroidism, 2.8%(3) of the patients had report suggestive of subclinical hyperthyroidism, and 1.9% (2) of the patients had overt hypothyroidism.[10] This study was similar to Sawant, A.M., et al. who in their study of 908 type 2 diabetic patients found that 10.3%of patients had hypothyroidism (overt and subclinical) and 1.7% of patients had hyperthyroidism (overt and subclinical).[11] Shan S, et al. in his study of 120 diabetic patients, 17% of patients had hypothyroidism and 7.5% had hyperthyroidism.[12] Staub JJ, et al. in their study of 290 type 2 DM patients found that 91 patients (31.4%) had abnormal TSH concentrations out of which 48.3% had subclinical hypothyroidism, 24.2% had subclinical hyperthyroidism, 23.1% had overt hypothyroidism, and 4.4% had overt hyperthyroidism.[13] In the present study, diabetic patients when compared with the control group of normal patients in Whickham study and a 20 years follow-up of Whickham survey by Swamy RM, et al. show that the prevalence of altered thyroid profile in the study group is significant (P = 0.0064).[14] The prevalence of thyroid disease as per Colorado thyroid disease prevalence conducted in 1995 was estimated to be 6.6% in the general population, with hypothyroidism being the most common presentation.[15,16] In our study, IR was found in both hypothyroid and hyperthyroid diabetic patients. Our finding is consistent with the findings of Kapadia et al. and Chubb et al.[17,18] Focus has been raised to look for the influence of thyroid hormone action on insulin levels. Conflicting data are available for the impact of thyroid dysfunction on insulin levels. Furthermore, the development of IR leads to many metabolic abnormalities. The main pathophysiological basis underlying glucose intolerance, dyslipidemia, abdominal obesity, and hypertension has been attributed to IR.[19,20] Hyperthyroidism is typically associated with worsening glycemic control and increased insulin requirements. There is underlying increased hepatic gluconeogenesis, rapid gastrointestinal glucose absorption, and increased IR.[21]

In our study, we have found that IR has increased significantly with increase in age. Aging is associated with detrimental changes in body composition, which persists even when elderly adults are matched to younger adults for BMI.[22] Aging is associated with detrimental changes in body composition including an increase in body weight and fat mass. Not only is abdominal fat, but also visceral adiposity is also associated with hyperinsulinemia or IR. Adiposity, therefore, is well accepted as a determinant of IR and may be a key mediator for the development of age-related IR.[23,24]

5. Conclusion

The relationship between diabetes mellitus and thyroid disorders is characterized by a complex interdependent interaction. Unidentified thyroid dysfunction could negatively impact diabetes and its complications and may be one of the prime causes of poor management of type 2 DM. Therefore, there is a need for routine assay of thyroid hormones in type 2 diabetic patients to improve the medical management as well as to reduce the morbidity in them.

6. Source of Funding

None.

7. Conflicts of Interest

None.

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