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Urology

Prevalence of Thyroid Disorders in Patients of Diabetes Mellitus in a Tertiary Care Hospital in North India

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Abstract | **Original Research Article**

Introduction: Diabetes Mellitus is characterised by relative or absolute deficiency in insulin secretion as well as insulin action. It is also associated with carbohydrate, protein and lipid metabolism disturbances. Patients of diabetes mellitus have higher prevalence of thyroid disorders as compared to the general population. ***Materials and Methods***: 243 patients of diabetes mellitus, coming to OPD department of Internal Medicine as well indoor patients in PIMS Medical College and Hospital were included. Measurement of weight, height, Body Mass Index, Blood pressure, Fasting plasma Glucose levels, Post prandial glucose, HbA1C, lipid profile, Renal Function Tests, Free Triiodothyronine FT3, Free Tetraiodothyronine (FT4) and Thyrotropin TSH levels tests were done. ***Results:*** Analysis shows that the prevalence of thyroid disorders in high in patients with type2 daibetes mellitus. Abnormal thyroid functions were detected in 77(31.7%) patients 38(15.6%) had Subclinical Hypothyroidism. 28(11.5%) patients had Overt Hypothyroidism whereas 11 (4.6%) patients had Hyperthyroidism. ***Conclusion:*** Type-2 Diabetes Mellitus patients have higher prevalence of thyroid dysfunction in the form of Subclinical Hypothyroidism, overt Hypothyroidism and Hyperthyroidism. So these patients require screening for thyroid functions.

Keywords: Type- 2 Diabetes Mellitus, Hypothyroidism, Subclinical Hypothyroidism.

INTRODUCTION

Diabetes Mellitus is a very common endocrine disorder. In Diabetes Mellitus there is either absolute or relative deficiency in insulin secretion and / or its action. There are also disturbances of carbohydrate, lipid and protein metabolism [1].

The prevalence of Diabetes is expected to rise to 300 million (7.8%) by the year 2030 [2]. The prevalence of thyroid dysfunction is increasing in patients of Diabetes Mellitus.

Insulin secretion is directly controlled by the thyroid hormones. In Hypothyroidism the glucose induced insulin secretion by the beta cells is reduced. Whereas in Hyperthyroidism the catecholamines and insulin resistance both are increased [3, 4]. Several studies have indicated the co- existence of both endocrine disorders. The prevalence of thyroid dysfunction in Diabetic patients have been reported to vary from 2.2 to 17 % [5, 6].

Diabetes Mellitus affects thyroid at two sites, at the level of the hypothalamus by controlling TSH release and also at peripheral tissues by converting T4 to T3 [7, 8].

AIMS AND OBJECTIVES

- To study the prevalence of thyroid disorders either Subclinical hypothyroidism, Overt hypothyroidism, or Hyperthyroidism in patients with type 2 Diabetes Mellitus.
- To find out any correlation between the glycosylated Hemoglobin HbA1C and TSH levels.
- To find out any association between the TSH levels and the duration of diabetes.

MATERIALS AND METHODS

This cross sectional study was conducted in Punjab Institute of Medical Sciences, Jalandhar. A Total of 243 patients coming to Medicine OPD as well as indoor patients having type 2 Diabetes Mellitus were enrolled. After obtaining informed consent, these

patients had to undergo weight and height monitoring, blood pressure readings, routine investigations like fasting blood sugar (FBS), Post prandial plasma glucose levels, HbA1C by CLIA (Chemilumescence immunoassay) technique, Renal function tests. Liver function tests, lipid profile, urine albumin creatinine ratio, Fundus examination, Thyroid Hormones like FT3, FT4 and TSH by CLIA (Chemilumescence Immunoassay) technique by Roshe E411 fully automated analyzer.

This study was approved by the institutional ethics committee.

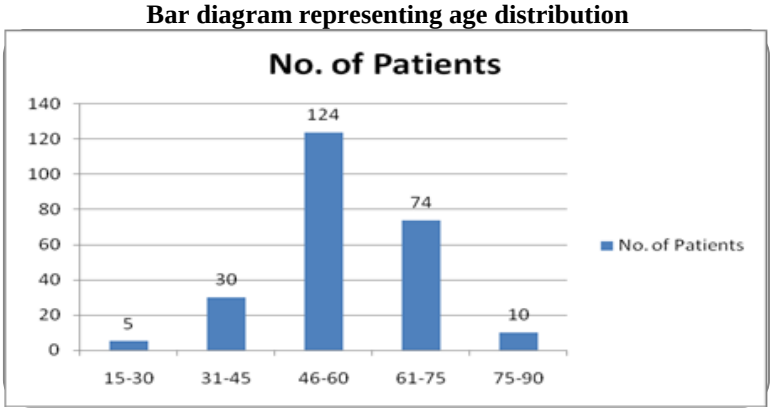
RESULTS

243 patients having Diabetes Mellitus aged from 17 years to 84 years were enrolled in PIMS hospital coming to Medicine OPDs and indoor patients admitted in medical wards in our hospital.

Table-1: Age distribution

Age	No. of Patients	% of patients
15-30	5	2%
31-45	30	12%
46-60	124	51%
61-75	74	30%
75-90	10	4%

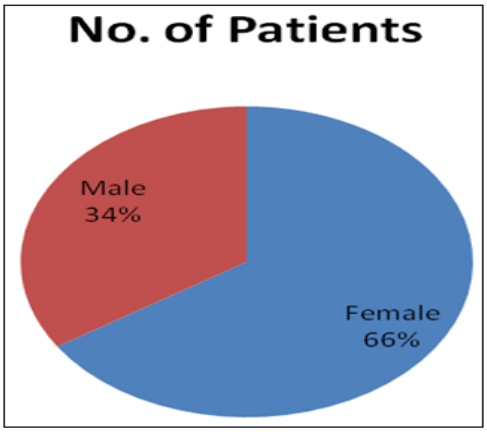
Bar diagram representing age distribution



Out of 243 patients 83 were males (34%) and 160 were females (66%).

Table representing Gender distribution

Gender	No. of Patients
Female	160
Male	83
Grand Total	243



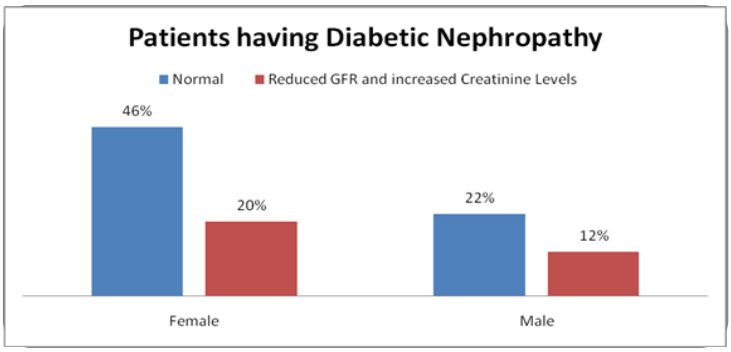
Pie chart representing gender distribution

Out of 243 patients, 32% patients had Diabetic Nephropathy which is a microvascular complication of Diabetes mellitus where as 68% patients had normal GFR.

Table representing the prevalence of Diabetic Nephropathy in our study group

Patients having Diabetic Nephropathy	Female	Male	Grand Total
Normal	46%	22%	68%
Reduced GFR and increased Creatinine Levels	20%	12%	32%
Grand Total	66%	34%	100%

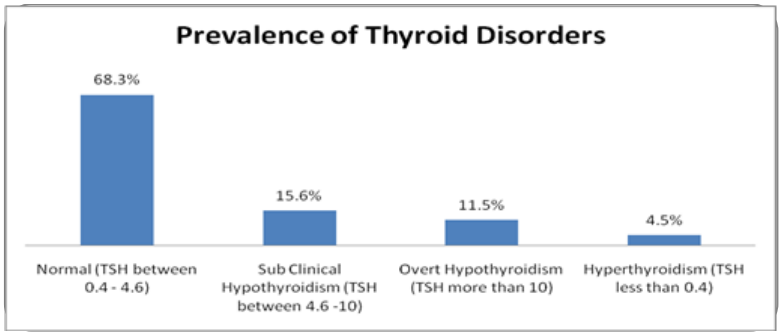
Bar diagram representing the prevalence of Diabetic Nephropathy according to sex distribution.



Our study found abnormal thyroid functions in 77 patients (31.7%) patients. 166(68.3 %) patients had normal TSH levels.38 patients (15.6%) had Subclinical Hypothyroidism. 28 (11.5%) patients were found to have Overt hypothyroidism.11 patients (4.5%) patients had Hyperthyroidism. Subclinical Hypothyroidism was the most common thyroid abnormality found in diabetic patients.

Table showing the prevalence of Thyroid disorders in Diabetic patients

Prevalence of Thyroid disorders	% of Patients	No. of Patients
Normal (TSH between 0.4 - 4.6)	68.3%	166
Sub Clinical Hypothyroidism (TSH between 4.6 -10)	15.6%	38
Overt Hypothyroidism (TSH more than 10)	11.5%	28
Hyperthyroidism (TSH less than 0.4)	4.5%	11



Bar diagram representing prevalence of Thyroid disorders in Diabetes Mellitus patients.

Our study however did not find any correlation between the glycosylated haemoglobin HbA1C levels and the TSH levels.

Correlations between HbA1C and TSH levels			
		HBAIC	TSH
HBAIC	Pearson Correlation	1	-.094
	Sig. (2-tailed)		.174
	N	210	210
TSH	Pearson Correlation	-.094	1
	Sig. (2-tailed)	.174	
	N	210	210

Our study also did not find any association between the TSH levels and the duration of diabetes.

Table representing the prevalence of hypothyroidism according to distribution of duration of Diabetes

	Prevalence of Hypothyroidism			
Category	**Normal**	**Hyperthyroidism**	**Overt Hypothyroidism**	**Grand Total**
Newly Detected	12	1	3	16
Less than 5 years	49	4	25	78
5-10 Years	64	4	22	90
10-15 Years	21	0	8	29
More than 15 Years	20	2	8	30
Grand Total	166	11	66	243

No association found between the prevalence of Thyroid disorders and the Duration of Diabetes Mellitus.

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	17.165[a]	12	.143
Likelihood Ratio	18.293	12	.107
N of Valid Cases	243		
a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .72.			

DISCUSSION

It has been well known that there is increased prevalence of thyroid disorders in patients of Type 1 Diabetes Mellitus due to common autoimmune origin, But a lot of studies in the past have reported increased prevalence in type 2 Diabetes as well. Thyroid Hormones increase the heptocyte plasma concentration of GLUT 2, the main glucose transporter in the liver. These increased level of GLUT 2 lead to abnormal glucose metabolism [9].

Our study found a high prevalence of Thyroid disorders in Diabetic patients about 31.7%, with Subclinical Hypothyroidism in 15.6% patients, Overt Hypothyroidism in 11% patients and Hyperthyroidism in 4.6% patients. Several previous studies have also reported a higher prevalence, Papaziffiropoulou *et al*., (the prevalence of thyroid disorders was 12.3%) [10]. Nobre *et al*., study also found out prevalence of thyroid disorders 12.7% [11]. Our study however did not find any correlation between the TSH levels and the HbA1C levels. Our study also did not find any association between the TSH levels and the duration of Diabetes mellitus. Our results are in concordance with Diez *et al*., whose study also did not find any significant relationship between the thyroid dysfunction and the duration of diabetes mellitus type 2 [12].

In hyperthyroidism increased lipolysis is observed which result in increase in FFA which further stimulates hepatic gluconeogenesis. Hyperthyroidism is also associated with increased growth hormone, glucagon and catecholomine levels which further contribute to impaired glucose tolerance [13, 14].

In Hypothyroidsim there is reduced rate of liver glucose production which accounts for decrease in the insulin requirement in diabetic patients having coexisting hypothyroidism. Also both clinical and subclinical hypothyroidsim have been recognised as insulin resistant states [15, 16].

In diabetes mellitus there is also increased prevalence of low T3 state. This “low T3 state” could possibly be explained by an impairment in peripheral conversion of T4 to T3. This state normalizes with improved glycemic control.

CONCLUSION

Since there is an increased prevalence of thyroid disorder in Type 2 diabetes, so screening of all the diabetic patients for thyroid profile should be done regularly in order to achieve good glycemic control as well as to decrease the complications of diabetes mellitus Type 2.

Results obtained from our study show that Overt hypothyroidism as well as subclinical hypothyroidism is frequently observed in patients Type 2 diabetes mellitus. However more studies with more number of patients are required in future to study this inter-relationship between these two endocrine disorders.

There is a complex interdependent interaction between these two endocrine disorders. Thyroid function tests should be recommended in patients with diabetes mellitus as failure to recognize the thyroid disorder may be the cause of poor diabetic control.

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