

Prevalence of Thyroid Dysfunction in Patients of Type 2 Diabetes Mellitus- A Prospective Study

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ABSTRACT

Introduction: Diabetes mellitus (DM) and thyroid dysfunction (TD) are the two most common health problems encountered in clinical practice. The unrecognized thyroid dysfunction may adversely affect the metabolic control and can cause micro-vascular and macro-vascular complications which in turn affect morbidity; mortality and quality of life. Aim of present study is to find out the prevalence of thyroid dysfunction in patients suffering from Type 2 Diabetes Mellitus and their correlation with complications like diabetic retinopathy.

Material and methods: In present study, total 150 subjects, 75 cases (Type 2 DM) and remaining 75 controls (Healthy subjects) were included. Detailed history was taken and clinical examination was done in all cases. Parameters like BMI, waist circumferences were measured and investigations like fasting blood sugar, PPBS, HbA1c, TSH, lipid profile etc were done. The data generated from the study was analyzed by appropriate statistical analysis tests. P value less than 0.05 was accepted as statistically significant.

Results: The mean age of subjects in cases was 56.12 ± 11.23 years and it was 54.71 ± 10.17 years in controls. The difference in weight between the two groups was statistically significant (P-value <0.001). The difference in waist circumference between the two groups was statistically not significant (P-value 0.594). There was a statistically significant difference in FBS, PPBS, HbA1c, HDL between two case and control groups (P-value <0.05). The difference in the proportion of thyroid dysfunction between case and control groups was statistically significant (P-value <0.05). Difference in the proportion of diabetic retinopathy between people with and without thyroid dysfunction was statistically significant (P-value <0.001).

Conclusion: The results of present study showed a high prevalence of thyroid dysfunctions among cases in comparison of controls. Therefore routine screening for thyroid dysfunction should be performed in patients suffering from type 2 diabetes mellitus.

Keywords: Diabetes Mellitus, Thyroid Dysfunction, Diabetic Retinopathy, Prevalence

control can cause various complications in patients suffering from DM.³

Like diabetes, thyroid disease is also common endocrine disorder globally. In India, about 42 million peoples are suffering from various thyroid diseases. Thyroid hormones play an important part in key metabolic pathways by regulating metabolism by actions in the brain, liver, skeletal muscle, brown fat, white fat and pancreas.⁴

Gonzalez GC et al.⁵ explained association between type 1 diabetes mellitus and thyroid dysfunction by autoimmune mechanism while association between type 2 DM and thyroid dysfunction is very complex and still not completely understood. Studies done by various authors have found that thyroid disease has higher widespread among the diabetic people in comparison of healthy individuals.

Wang C et al.⁶ observed that the presence of thyroid dysfunction in type 2 diabetes mellitus patients can cause micro-vascular and macro-vascular complications which in turn affect morbidity, mortality and quality of life. In previous studies⁷⁻⁸ more focus has been given to these major complications, less focus is given on thyroid dysfunction and its effect on various end organs in diabetes. Early diagnosis of thyroid dysfunction will help in reduction of morbidity due to thyroid dysfunction in type 2 diabetes mellitus patients. Therefore aim of present study is to find out the prevalence of Thyroid Dysfunction in Patients suffering from Type 2 Diabetes Mellitus and their correlation with complications like diabetic retinopathy.

MATERIAL AND METHODS

Present study was a prospective cross-sectional study conducted in the department of Medicine at G.S.V.M. Medical College Kanpur. All type 2 diabetes mellitus patients and normal subjects with no diabetes of > 30 years age attending Outpatient department and inpatient department were included in present study. Patients suffering from type 1 diabetes mellitus, patients suffering from type 2 DM but age < 30 or >70 years, patients not willing to participate

INTRODUCTION

Diabetes mellitus, one of the primary health problems has affected about 422 million people worldwide and estimated to be increased to 629 million by year 2045.^{1,2} Unfortunately our country only after China has maximum number of diabetic persons. As per various research papers, 80% diabetes persons come from low and middle income groups. Increased duration of diabetes mellitus and poor glycaemic

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in the study, patients on medication affecting thyroid dysfunction and pregnant females were excluded from the study.

Detailed history was taken and clinical examination was done in all cases. Parameters like BMI, waist circumferences were measured and investigations like fasting blood sugar, PPBS, HbA1c, TSH, lipid profile etc were done. Informed consent from patients and approval from institutional ethics committee was taken. A total of 150 subjects were included in final analysis. Out of 150 subjects, 75 were cases (Type 2 DM) and remaining 75 were controls (Healthy subjects). The data generated from the study was analyzed by appropriate statistical analysis tests. P value less than 0.05 was accepted as statistically significant.

Parameter	Group		P- value
	Cases (n=75)	Control (n=75)	
Age	56.12 ± 11.23	54.71 ± 10.17	0.127
Gender			
Male	51 (68.0%)	54 (72.0%)	0.498
Female	24 (32.0%)	21 (28.0%)	

Table-1: Comparison of Age and Gender between both groups

RESULT

Table 1 shows comparison of age and gender between both case and control groups. The mean age of subjects in cases was 56.12 ± 11.23 years and in controls 54.71 ± 10.17 years. The difference in the age between the two groups was statistically not significant (P-Value 0.127). Among the cases, 51 (68.0%) participants were male and 24 (32.0%) participants were female. Among the controls, 54 (72.0%) participants were male and 21 (28.0%) participants were female. The difference in the proportion of gender between study groups was statistically not significant (P-value 0.498). Table 2 shows comparison of anthropometric parameters between both case and control groups. The mean height in cases was 160.08 ± 8.12 cms while in controls it was 160.12 ± 7.98 cms. The mean weight in cases was 70.47 ± 13.02 kg while in controls it was 66.14 ± 11.02 kg. The difference in weight between the two groups was statistically significant (P-value <0.001). The mean BMI in cases was 25.99 ± 4.39 while in controls it was 24.16 ± 4.01. The difference in BMI between the two groups was statistically significant (P-value <0.001). The mean waist circumference in cases was 93.22 ± 13.97 while in controls it was 93.14 ± 12.79. The difference in

Parameter	Group		P- value
	Cases (n=75)	Control (n=75)	
Height (cm)	160.08 ± 8.12	160.12 ± 7.98	0.894
Weight (kg)	70.47 ± 13.02	66.14 ± 11.02	<0.001
BMI	25.99 ± 4.39	24.16 ± 4.01	<0.001
Waist circumference	93.22 ± 13.97	93.14 ± 12.79	0.594

Table-2: Comparison of anthropometric parameters between both groups

Parameter	Group		P- value
	Cases (n=75) Median	Control (n=75) Median	
FBS	136	105.4	<0.001
PPBS	189	135	<0.001
HbA1c	7.6	5.5	<0.001
Cholesterol	158	161	0.079
Triglycerides	132	121.5	0.051
HDL	35	37	<0.001
LDL	91.4	97.6	0.284

Table-3: Comparison of clinical parameters between both groups

Parameter	Group		P- value
	Cases (n=75) Median	Control (n=75) Median	
Thyroid dysfunction			
Yes	16 (21.3%)	9 (12.0%)	<0.001
No	59 (78.7%)	66 (88.0%)	
Type of thyroid			
Hyperthyroidism	2 (2.67%)	1 (1.33%)	0.012
Hypothyroidism	4 (5.33%)	2 (2.67%)	
Subclinical Hyperthyroidism	1 (1.33%)	0 (0.0%)	
Subclinical Hypothyroidism	9 (12.0%)	6 (8.0%)	
ND	59 (78.7%)	66 (88.0%)	

Table-4: Comparison of thyroid dysfunction between both groups

Diabetic retinopathy	Thyroid dysfunction		P-value	
	Yes (n=16)	No (n=59)		
NPDR	6 (37.5%)	14 (23.7%)	<0.001	
PDR	2 (12.5%)	4 (6.77%)		
No	8 (50.0%)	41 (69.49%)		
	Hypothyroidism (n=13)	Hyperthyroidism (n=3)	Euthyroidism (n=59)	*
NPDR	5 (38.46%)	1 (33.3%)	14 (23.7%)	
PDR	2 (15.38%)	0 (0.0%)	4 (6.77%)	
No	6 (46.15%)	2 (66.6%)	41 (69.49%)	

*No statistical test was applied due to 0 subject

Table-5: Comparison of diabetic retinopathy in thyroid dysfunction between both groups

waist circumference between the two groups was statistically not significant (P-value 0.594).

Table 3 Compares clinical parameters between both case and control groups. The median FBS in cases was 136 while in controls it was 105.4. The median PPBS in cases was 189, it was 135 in controls. The median HbA1c in cases was 7.6 while in controls, it was 5.5. The median cholesterol in cases was 158, it was 161 in controls. The median Triglycerides in cases were 132 while in controls it was 121.5. The median HDL in cases was 35, it was 37 in controls. The median LDL in cases was 91.4 while in controls it was 97.6. There was a statistically significant difference in FBS, PPBS, HbA1c, HDL between two case and control groups (P-value <0.05). There was no statistically significant difference in cholesterol, triglyceride, LDL between two groups (P-value >0.05).

Table 4 shows the comparison of thyroid dysfunction between case and control groups. Among cases, 16 (21.3%) had thyroid dysfunction while among controls, 9 (12.0%) had thyroid dysfunction. The difference in the proportion of thyroid dysfunction between case and control groups was statistically significant (P-value <0.05). Among cases, 2 (2.67%) had hyperthyroidism, 4 (5.33%) had hypothyroidism, 1 (1.33%) had subclinical hyperthyroidism and 9 (12.0%) had subclinical hypothyroidism. Among controls, 1 (1.33%) had hyperthyroidism, 2 (2.67%) had hypothyroidism and 6 (8.0%) had subclinical hypothyroidism.

In present study, among people with thyroid dysfunction, 6 cases (37.5%) had NPDR and 2 cases (12.5%) had PDR. Among people without thyroid dysfunction 14 cases (23.7%) had NPDR and 4 cases (6.77%) had PDR. In present study, difference in the proportion of diabetic retinopathy between people with and without thyroid dysfunction was statistically significant (P-value <0.001). (Table 5)

DISCUSSION

Wang C et al.⁶ observed that the presence of thyroid dysfunction in type 2 diabetes mellitus patients can cause micro-vascular and macro-vascular complications which in turn affect morbidity, mortality and quality of life. In previous studies more focus has been given to these major complications, less focus is given on thyroid dysfunction and its effect on various end organs in diabetes. Present study was conducted in the Department of General Medicine, G.S.V.M. Medical College Kanpur on 75 type-2 Diabetes

mellitus patients (designated as Cases) and 75 normal subjects without type-2 diabetes (designated as Controls).

In present study, the mean age of subjects in cases was 56.12 ± 11.23 years and in controls 54.71 ± 10.17 years. The difference in the age between the two groups was statistically not significant (P-Value 0.127). Among the cases, 51 (68.0%) participants were male and 24 (32.0%) participants were female. Among the controls, 54 (72.0%) participants were male and 21 (28.0%) participants were female. The difference in the proportion of gender between study groups was statistically not significant (P-value 0.498). Similar results were observed in the studies done by Jalal MJ et al⁹, Pasupathi P et al¹⁰ and Telwani AA et al⁷.

In present study anthropometric variables like weight and Body mass index showed statistically significant difference between both groups while the difference in waist circumference between the two groups was statistically not significant (P-value 0.594). In present study with regard to laboratory parameters like FBS, PPBS, HbA1c, HDL statistically significant difference was observed between both groups while no statistically significant difference was seen in parameters like cholesterol, triglyceride, LDL between two groups (P-value >0.05).

In our study, thyroid dysfunction was more common in diabetic females and subclinical hypothyroidism was the most common thyroid dysfunction observed in present study. Similar results were observed in studies done by Wang C et al,⁶ Reddy MSM et al² and Tyagi VK et al.¹¹ In our study, prevalence of thyroid dysfunction was higher among cases (21.3%) in comparison of controls (12.0%). The difference in the proportion of thyroid dysfunction between case and control groups was statistically significant in present study (P-value <0.05). Study done by various authors like Jalal MJ et al,⁹ Reddy MSM et al,² Telwani AA et al⁷ and Deshmukh V et al¹² observed higher prevalence of thyroid dysfunction among type 2 diabetes mellitus patients in comparison of healthy individuals. Chang CH et al.¹³ observed that patients suffering from metabolic syndrome (21%) were at higher risk of developing subclinical hypothyroidism.

In present study, among people with thyroid dysfunction, 6 cases (37.5%) had NPDR and 2 cases (12.5%) had PDR. Among people without thyroid dysfunction 14 cases (23.7%) had NPDR and 4 cases (6.77%) had PDR. In present study, difference in the proportion of diabetic retinopathy between people with and without thyroid dysfunction was statistically

significant (P-value <0.001). Results of our study coincides with the study done by Chandrakumar SV et al¹⁴ and Reddy MSM et al² whose found statistically significant association between subclinical and overt hypothyroidism with the development of diabetic retinopathy. In contrast to present study, Obaid N et al.¹⁵ observed insignificant association between thyroid dysfunction and diabetic retinopathy.

CONCLUSION

The results of present study showed a high prevalence of thyroid dysfunctions among cases in comparison of controls. Therefore routine screening for thyroid dysfunction should be performed in patients suffering from type 2 diabetes mellitus. Early diagnosis of thyroid dysfunction will help in reduction of morbidity due to thyroid dysfunction in type 2 diabetes mellitus patients.

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