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Original Research Article

A Hospital-Based Assessment of the Proportion of Thyroid Dysfunction in Patients with Type 2 Diabetes

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Abstract

Aim: The aim of the present study was to study the proportion of Thyroid dysfunction in patients with type 2 Diabetes.

Methods: The present study was conducted in the Department of Medicine, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India for the period of one year. 400 patients were included in the study. Out of the 400 subjects, 200 were cases (Type 2 diabetes Mellitus) and the remaining 200 were controls.

Results: The mean age of subjects in cases was 55.95 ± 11.19 years and it was 54.56 ± 10.09 years in controls. The difference in the age between the two groups was statistically not significant (P-Value 0.120). The difference in the proportion of gender between study groups was statistically not significant (P-value 0.510). The mean height in cases was 161.02 ± 8.3 cm, it was 161.01± 7.79 in controls. The mean weight in cases was 69.2 ± 12.64 kg, it was 65.47 ± 10.86 in controls. The difference in weight between the two groups was statistically significant. (P-value <0.001). The mean BMI in cases was 26.21 ± 4.7, it was 24.8 ± 4.15 in controls. The difference in BMI between the two groups was statistically significant. (P-value <0.001).

Conclusion: The present study showed a high prevalence of thyroid dysfunctions in patients of type 2 DM. Hence, screening for thyroid dysfunction in diabetic patients should be performed routinely, so as to recognize these dysfunctions early, thus helping in improving the quality of life and reducing the morbidity rate in them.

Keywords: Diabetes Mellitus, Thyroid Dysfunction FBS, PPBS, HBA1C, BMI, Waist Circumference

Introduction

Diabetes Mellitus (DM) has emerged as pandemic health problem in the world and it is a common endocrine disorder, which has reached 20% in urban population and 10% in rural population in India. The prevalence of thyroid dysfunction in DM is increasing alarmingly. The World Health Organization (WHO) has projected

that the global prevalence of diabetes will increase to 300 million (7.8%) by 2030. [1] Some of the factors like sedentary lifestyle, hypertension, dietary indiscretions, ethnicity and obesity are thought to be major contributions. [2] The association of thyroid dysfunction with type II DM is widely known and this study was first published in 1979. [3,4]

The thyroid hormones directly control insulin secretion. In hypothyroidism there is a reduction in glucose-induced insulin secretion by beta cells and catecholamines are increased in hyperthyroidism, and insulin resistance will be increased. [5-7] The DM influences the thyroid dysfunction in two sites, first at the level of hypothalamus by controlling TSH release and second at the peripheral tissues by converting T4 to T3 [8,9]

The co-existence dysfunction of thyroid in type 2 diabetes mellitus will worsen the macro vascular and microvascular complications, morbidity, mortality, and quality of life. [10] Detecting dysfunction of the thyroid gland in type 2 DM will inform clinicians to give optimal treatment for metabolic conditions since thyroid condition such as hypothyroidism will delicate achievement of glycaemic target and other comorbidities. "Functional changes in the thyroid gland may be related to metabolic syndrome with its associated factors which include obesity, insulin resistance (IR), raised blood pressure, lipid and glucose metabolism abnormalities, and cardiovascular dysfunction". [11,12]

Since much of the focus is given to major microvascular and macrovascular complications in diabetes, the focus on thyroid dysfunction and its effect on various end organs in diabetes have not been studied in detail. There is death of research studies which have reported the relationship between various metabolic parameters and Thyroid dysfunction in subjects with Type 2 DM. [13,14]

The aim of the present study was to study the proportion of Thyroid dysfunction in patients with type 2 Diabetes.

Methods

The present study was conducted in the Department of Medicine, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India for the period of one year. 400 patients were included in the study. Out of the 400 subjects, 200 were cases (Type 2 diabetes Mellitus) and the remaining 200 were controls.

Approval of the study was obtained by the institutional human ethics committee. Informed written consent was obtained from all the study participants, and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained.

All the type-2 Diabetic patients and normal subjects with no diabetes aged more than 30 yrs attended to the outpatient clinic and admitted in the General Medicine department was considered as the study population. Patients with Type 2 diabetes and normal subjects aged more than 30 years irrespective of glucose control and treatment (OHA/insulin) were included in the study, Exclusion criteria included patients of type 1 diabetes mellitus, previously on medications affecting thyroid dysfunction and pregnant females. The general and local examination was performed by measuring BMI, waist circumference. Analysis based on patient's lab values for FBS, PPBS, HBA1C AND TSH, Lipid Profile.

Results

Table 1: Comparison of age, gender, mean of anthropometric parameters between the study groups

Parameter	Groups		P-value
	Cases (n=200)	Controls (n=200)	
Age	55.95 ± 11.19	54.56 ± 10.09	0.120
Gender			
Male	120 (60%)	130 (65%)	0.510
Female	80 (40%)	70 (35%)	
Height (in cm)	161.02 ± 8.3	161.01 ± 7.79	0.950
Weight (in kg)	69.2 ± 12.64	65.47 ± 10.86	<0.001
BMI	26.21 ± 4.7	24.8 ± 4.15	<0.001
Waist circumference	92.82 ± 13.6	93.39 ± 12.53	0.620

The mean age of subjects in cases was 55.95 ± 11.19 years and it was 54.56 ± 10.09 years in controls. The difference in the age between the two groups was statistically not significant (P-Value 0.120). Among the cases, 120 (60%) participants were male and 80 (40%) participants were female. Among the controls, 130 (65%) participants were male and 70 (35%) participants were female. The difference in the proportion of gender between study groups was statistically not significant (P-value 0.510). The mean height in cases was 161.02 ± 8.3 cm, it was 161.01± 7.79 in controls. The mean weight in cases was 69.2 ± 12.64 kg, it was 65.47 ± 10.86 in controls. The difference in weight between the two groups was statistically significant. (P-value <0.001). The mean BMI in cases was 26.21 ± 4.7, it was 24.8 ± 4.15 in controls. The difference in BMI between the two groups was statistically significant. (P-value <0.001). The mean waist circumference in cases was 92.82 ± 13.6, it was 93.39 ± 12.53 in controls. The difference in waist circumference between the two groups was statistically not significant. (P-value 0.620)

Table 2: Comparison of thyroid dysfunction and type of thyroid between groups

Parameters	Groups		Chi square	P value
	Cases	Controls		
Thyroid dysfunction				
Yes	40 (20)	20 (10)	11.710	<0.001
No	160 (80)	180 (90)		
Type of thyroid				
Hyperthyroidism	5 (10)	3 (6)	12.223	0.018
Hypothyroidism	10 (20)	7 (14)		
Sub clinical Hyperthyroidism	5 (10)	0		
Sub clinical Hypothyroidism	20 (10)	10 (5)		
ND	160 (80)	180 (90)		

The difference in the proportion of diabetic retinopathy between people with and without thyroid dysfunction was statistically significant. (P-value <0.001).

Table 3: Comparison of diabetic retinopathy between thyroid dysfunction

Diabetic retinopathy	Thyroid dysfunction		Chi square	P value
	Yes (n=50)	No (n=150)	15.733	<0.001
NPDR	20 (40%)	50 (33.34%)		
PDR	9 (18%)	10 (6.66%)		
No	21 (42%)	90 (60%)		

	Hypothyroidism (N=45)	Hyperthyroidism (N=5)	Euthyroidism (N=150)	
NPDR	17 (37.77%)	2 (40%)	40 (26.67%)	
PDR	10 (22.22%)	0 (0%)	10 (6.66%)	
No	18 (40%)	3 (60%)	100 (66.67%)	

Among people with hypothyroid 17 (37.77%) had NPDR, 10 (22.22%) had PDR. Among people with hyperthyroidism 2 (40%) had NPDR. Among people with euthyroidism, 40 (26.67%) had NPDR and 10 (6.66%) had PDR.

Discussion

Type 2 diabetes mellitus (DM) is a growing problem in our country and we have observed that many patients are associated with thyroid dysfunction later in their life. However, the prevalence of thyroid dysfunction in these patients has not been investigated in this part of the country. Since much of the focus is given to these major complications, the focus on thyroid dysfunction and its effect on various end organs in diabetes have not been studied in detail.

A total of 400 subjects were included in our final analysis, out of which 200 (50%) were cases of Type 2 diabetes mellitus and the remaining 200 were controls. We found no significant difference between the 2 study groups with respect to gender distribution and mean age. Telwani AA et al [13], and Pasupathi P et al [15], and Jalal MJ et al [16], also observed that the two groups were comparable in their studies.

Telwani

AA et al [13], also observed that the prevalence of thyroid dysfunctions was high in diabetic patients compared to controls (29% versus 9%, P-value <0.001). Deshmukh V et al [11], in their study, observed that about 121 out of 432 patients (28%) were diagnosed with Thyroid dysfunction. Similarly, Chang CH et al [12], in their study, also observed that patients with metabolic syndrome were at (21%) excess risk of developing subclinical hypothyroidism.

In our study, among the spectrum of thyroid disorders, Subclinical hypothyroidism was the most commonly observed disorder in both cases (10%) and also controls (5%) which was similar to that of observed by Jalal MJ et al. [16] In cases, only 2% were hyperthyroid, but 4.4% were hypothyroid with only one case (0.4%) of subclinical hyperthyroidism. Similarly, in the study by Telwani AA et al [13], the most common thyroid disorder in diabetic patients was subclinical hypothyroidism (16%) while the least common was hyperthyroidism (1%).In our study, in controls, only 1.2% were hyperthyroid, 2% were hypothyroid with none cases of subclinical hyperthyroidism.

Present study results showed that the difference in the proportion of diabetic retinopathy between people with and without thyroid dysfunction was statistically significant. Our results matched with Chandrakumar SV et al [17], who found a significant association between subclinical and overt hypothyroidism with the development of diabetic retinopathy. Obaid N et al [18], concluded that thyroid dysfunction was found insignificant number of patients with diabetic retinopathy. [19]

Conclusion

The present study showed a high prevalence of thyroid dysfunctions in patients of type 2 DM. Hence, screening for thyroid dysfunction in diabetic patients should be performed routinely, so as to recognize these dysfunctions early, thus helping in improving the quality of life and reducing the morbidity rate in them. It was

observed that thyroid function levels were altered in DM patients, in particular with T3 and TSH levels and it may be concluded that a regular screening of diabetes mellitus patients for thyroid function studies is recommended to avoid further complications of thyroid dysfunctions.

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