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Screening of Association between Glycaemic Control, Type of Treatment and Lipid Profile with Thyroid Profile in Patients with Diabetes Mellitus: A Hospital Based Study

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Abstract

Background: Diabetes mellitus associated with an abnormal profile is one of the major causes for mortality in diabetes mellitus patients. The present study aims to screen the association between glycaemic control, type of treatment and lipid profile with thyroid profile in diabetes mellitus patients.

Materials and Methods: The prospective study was done in the Department of General Medicine. A total of 100 diabetes mellitus patients were included in the study. They were explained regarding study procedure and informed consent was obtained. All the patients' glycaemic control, type of treatment received and lipid profile was recorded and analysed with Statistical Package for Social Sciences (SPSS 16.0) version software.

Results: The study showed that 20 euthyroid, 1 hyperthyroid and 3 hypothyroid have > 7 glycaemic control. 3 hyperthyroid and 9 hypothyroid patients were using oral hypoglycemic drugs. 45 eutyhroid patients showed abnormal cholesterol levels. 3 hyperthyroid and 15 hypothyroid patients showed changes in HDL levels. 3 hyperthyroid and 13 hypothyroid patients showed abnormal LDL levels.

Conclusion: Study observations showed significant correlation between thyroid profile and glycaemic control, type of treatment and lipid profile in diabetes mellitus patients,

Keywords: Diabetes mellitus, Insulin, Oral hypoglycemic drugs, lipid profile, glucose, glycaemic control

Introduction

Diabetes mellitus (DM) is the predominant endocrine disorder worldwide accounting for 90% of cases globally[1]. The worldwide prevalence of DM has risen over the past two decades. Prevalence of IFG is also increasing. Globally the number of people with DM is expected to rise from the current estimate of 150

million to 220 million in 2010 and 300 million in 2025[2]. An epidemic of DM is underway in both developed and developing countries. Genetic, gender, age and ethnic background are important factors in determining the risk for the development of DM. It is more common in females and an increased prevalence in certain racial and ethnic minority groups is seen[3,4].

In the past, it was believed that the overwhelming majority of children with type 1 DM with only 1-2% of children considered having type 2 DM. Recent studies suggest that as many as 8-45% of children with newly diagnosed DM have non immune mediated DM[5]. Prevalence of type 2 DM is expected to rise rapidly in the future because of increasing obesity and reduced level of physical activity. It is complex and involves interaction of genetic and environmental factors like excessive caloric intake leading to obesity and a sedentary lifestyle. Genetically DM consists of monogenic and polygenic forms[6,7]. The monogenic genes involved have been identified and characterized. They are seen in young individuals often in the first two or three decades of life. In the polygenic forms, the candidate gene approach has not been productive in identifying the genes. The approach has demonstrated that genetic variation in the gene that encodes a ubiquitously expressed member of the calpain like cysteine protease family (calpain-10) is associated with increased risk[8]. Type 2 DM is characterized by 3 pathophysiological abnormalities. One is peripheral insulin resistance, second impaired insulin secretion and third excessive hepatic glucose production. Obesity (visceral or central as evidenced by hip-waist ratio) is very common in type 2 DM. Adipocytes secrete a number of biologic products (leptin, TFN-α, free fatty acids, resistin and adiponectin) that modulate insulin secretion, insulin action, body weight and may contribute to insulin resistance[9]. In early stages of this disorder, glucose tolerance remains normal despite insulin resistance because the pancreatic beta cells compensate by increasing insulin output. As insulin resistance and compensatory hyperinsulinemia progresses, pancreatic islets are unable to sustain the hyperinsulinaemic state. Impaired glucose tolerance characterized by elevations in postprandial glucose then develops. The changes in glucose level affect the functions of various glands and systems in the body. Long term DM affects the thyroid function. The present study aims to screen the glycaemic control, type of treatment received and lipid profile in association with thyroid profile in diabetes mellitus patients.

Materials and Methods

Study Settings

The prospective study was done in the Department of General Medicine, Command Hospital Air force, Bangalore, Karnataka. It was ethically cleared by Institutional Human Ethics Committee (IHEC).

Inclusion criteria

- Both genders
- Diabetes mellitus
- On Insulin or Oral Hypoglycaemic agents
- Willing to give informed consent form

Exclusion criteria

- Diabetes more than 25 years
- Liver diseases
- Gall bladder diseases
- Using steroids
- Pregnancy

Procedure

The study included 100 patients based on inclusion and exclusion criteria. All the patients were explained study protocol and informed consent was obtained. Patient's demographic data was recorded. Blood samples were

collected from each patient used for the estimation of HbA_1C, lipid profile and Thyroid profile. Fully automated analyser used for estimation of HbA_1C and lipid profile. ELISA method used for thyroid profile estimation[10,11].

Statistical analysis

The data was expressed in number and percentage. Microsoft excel (Version 2010) used for the calculation of percentage.

Results

Total of 100 patients were included in the study. Out of 100 patients 81 had euthyroid profile, 3 hyperthyroid and 16 hypothyroid profile. 20 eythyroid, 1 hypethyroid and 3 hypothyroid patients showed glycaemic control more than 7 (Table-1). Most of the euthyroid, hypothyroid and hyperthyroid patients were on oral hypoglycaemic drugs than insulin. 29 euthyroid and 7 hypothyroid patients were taking insulin (Table-2). Thyroid profile showed significant difference in three types of lipid abnormalities….. 45 in euthyroid and 4 in hypothyroid showed changes in cholesterol level. 13 hypothyroid and 3 hyperthyroid patients showed significant changes in LDL levels. 58 euthyroid, 3 hyperthyroid and 15 hypothyroid patients showed significant changes in HDL levels (Table-3)

Discussion

Diabetes mellitus is a risk factor for atherosclerosis[40]. Macrovascular complications account for 80% of the deaths in DM. 60% being attributable to ischemic heart disease (IHD). Atherosclerosis risk is greatest in patients with poor glycaemic control possibly because of associated hypercholesterolemia and hypertriglyceridemia. Involvement of coronary, cerebral and peripheral vessels increases the incidence of myocardial infarction, stroke and lower extremity gangrene. Hypertriglyceridemia is common in DM, both as a transient accompaniment of poor metabolic control and as a persistent finding in some relatively well glycemic controlled patients. In the latter situation a genetic form of hyperlipidemia may coexist with DM[11]. Elevated level of LDL cholesterol is due to overproduction of VLDL particles in obese patients with DM leading to increased conversion of VLDL to LDL. Insulin deficiency reduces the activity of LDL receptors by impairing LDL clearance. Consumption of excessive saturated fatty acids and cholesterol can suppress the activity of LDL receptors and accentuate the rise in LDL levels. Glycation and oxidation of LDL may reduce the affinity of LDL for its receptors and thereby lowering its clearance rate. Low HDL cholesterol also contributes to increased risk of coronary artery disease in patients with DM. HDL protects against atherosclerosis by 2 mechanisms that reverse cholesterol transport and inhibition of LDL oxidation by paraoxonase and increase the utilization of lipids by peripheral cells. In this study, there was a significant association between the lipid profile and thyroid profile. Yun Z et.al study also showed similar results. In the study they observed significant association between the lipid profile and thyroid profile. Essam HJ study showed the relationship between lipid profile and thyroid profile in patients with type 2 diabetes mellitus. The study showed that patients with increased lipid profile have abnormal thyroid profile. In overall it was observed that glycaemic control and lipid profile significantly affect the thyroid profile.

Conclusion

The study results showed that patients with abnormal lipid profile showed changes in thyroid profile. The treatment of patients like this need more attention to

reduce the mortality rate. Correction of lipid and thyroid profile can improve the quality of patients life.

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Legends Tables

Table 1: Association of glycaemic control with thyroid profile

Glycaemic control (%)	Number of Patients	Thyroid dysfunction					
		Euthyroid		Hyper thyroid		Hypo thyroid	
		N	%	n	%	n	%
<7	76	61	80.30	2	2.60	13	17.10
>7	24	20	83.30	1	4.10	3	12.50
Total	100	81	81.00	3	3.00	16	16.00

Table 2: Association of type of treatment with thyroid profile

Treatment	Number of patients	Thyroid dysfunction					
		Euthyroid		Hyper thyroid		Hypo thyroid	
		n	%	n	%	n	%
Insulin	36	29	80.60	0	0.00	7	19.40
Oral hypoglycaemic drugs	64	52	81.30	3	4.70	9	14.10
Total	100	81	81.00	3	3.00	16	16.00

Table 3: Association of lipid profile with thyroid profile

Lipid profile	Number of patients	Thyroid dysfunction					
		Euthyroid		Hyper thyroid		Hypo thyroid	
		n	%	n	%	n	%
Cholesterol	49	45	91.80	0	0.00	4	8.20
LDL	87	71	81.60	3	3.4	13	14.90
HDL	76	58	76.30	3	3.9	15	19.70
Total	100	81	81.00	3	3.00	16	16.00