DETERMINE THE FREQUENCY OF DYSLIPIDEMIA IN PATIENTS WITH THYROID DYSFUNCTION

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ABSTRACT

Objective: To determine the frequency of dyslipidemia in patients with thyroid dysfunction.
Study Design: Cross-sectional analytical study.
Place and Duration of Study: Department of Medicine, Combined Military Hospital, Kharian. Study duration extended, from Jan 2015 to Jan 2016.
Methodology: All patients of either gender having age 20-70 years presenting with thyroid dysfunction of more than one year were enrolled in the study. The blood sample was collected in a sterile manner after an overnight fasting of 12 hours for serum cholesterol, triglycerides, low density lipoprotein, very low density lipoprotein and high density lipoprotein levels. All samples were sent to hospital laboratory and verified by pathologist.
Results: Mean age of the patients was 51.8 ± 16.51 years. There were 54 (57.4%) Males and 40 (42.6%) females (1.35:1). Mean duration of disease was 2.06 ± 0.33 years. Dyslipidemia was observed in 39 (41.5%) patients.
Conclusion: Significant number of patients with thyroid disorder have dyslipidemia. With increasing duration of disease the frequency of dyslipidemia increases.

Keywords: Cholesterol, Dyslipidemia, Thyroid dysfunction, Lipid profile.

INTRODUCTION

Thyroid gland play an important role in regulation of cellular activity and Influence basal metabolic rate and general metabolism[1]. According to the 6-year duration national health and nutrition examination survey (NHANES III) study, the prevalence of hypothyroidism was 4.6% (0.3% clinical and 4.3% subclinical) and of hyperthyroidism 1.3% (0.5% clinical and 0.7% subclinical), in population aged atleast years, showing an age and sex dependence[2]. Dyslipidemia is a frequent metabolic abnormality found in patient with thyroid disease, either in clinical or subclinical forms of the disease, and contributes to the end product of the effect of thyroid hormones in all aspects of lipid metabolism resulting in various quantitative and/or qualitative changes of triglycerides, phospholipids, cholesterol and other Lipoproteins. In thyroid disease, dyslipidemia and the concomitant metabolic abnormalities, in combination with the thyroid hormone-induced hemodynamic alterations, reveal the high risk for cardiovascular disease[3]. In general, hypercholesterolemia is associated with overt and subclinical hypothyroidism mainly due to elevation of low density lipoprotein (LDL) cholesterol levels, whereas high density lipoprotein (HDL) cholesterol concentration is usually normal or even elevated[4]. Lipidprofile is significantly raised in hypothyroid patients[5]. In the recent literature too correlation between dyslipidemia and thyroid disorders have been established[6].

The rationale of this study was to determine the frequency of dyslipidemia in thyroid disorders in order to ascertain the local perspective. Also lipid disorders are treatable and its treatment may improve the overall outcome of patients with thyroid disorder.

METHODOLOGY

This cross-sectional analytical study was carried out in the department of Medicine, Combined Military Hospital, Kharian, from

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January 2015 to January 2016. The required sample size came out to be 94 patients. By taking prevalence of dyslipidemia 42%[6], this sample size was calculated using the WHO software. Sampling technique used was non probability consecutive sampling. Patients of either gender with age 20 to 70 years and having thyroid dysfunction for more than one year were included in the study. Patients with congestive cardiac failure, type 2 DM, critically ill patients, chronic liver disease and chronic renal failure were not included in the study. The following operational definitions were used for thyroid disorders and dyslipidemia. Euthyroid: TSH 0.27 to 4.20µUI/ml and FT4 0.93 to 1.7ng/dL. Clinical hypothyroidism: TSH >4.20µIU/L and FT4<0.93 ng/dL. Clinical hyperthyroidism: TSH<0.27µIU/L and FT4>1.70 ng/dL. Subclinical hypothyroidism: TSH >4.20 µIU/L and FT4 0.93 to 1.7 ng/dL. Subclinical hyperthyroidism: TSH <0.27 µIU/L and FT4 0.93 to 1.7 ng/dL. Presence of any of above the condition was considered as thyroid dysfunction. Cholesterol >200mg/dL and Triglyceride more than 150mg/dL and LDL >130mg/dL and HDL <40mg/dL were considered as dyslipidemia.

This study was conducted after approval from hospital ethical committee. Consenting cases, meeting inclusion and exclusion criteria were enrolled in the study from the Outpatient department to Medical Unit-1, Military Hospital. The blood sample was collected in a sterile manner after an overnight fasting of 12 hours for serum cholesterol, triglycerides, LDL, VLDL and HDL levels and was sent to hospital laboratory and verified by pathologist.

Data was analyzed on Statistical Package for the Social Sciences (SPSS) version 20. Demographic data was presented as Simple descriptive statistics giving mean and standard deviation for age and duration of disease. Qualitative variables like gender and dyslipidemia were presented as frequency and percentages. Effect modifiers were controlled through stratification of age,gender and duration of disease to see the effect of these on outcome variable. Post stratification Chi square test was applied taking *p*-value of <0.05 as statistically significant.

RESULTS

Mean age of the patients was 51.08 ± 16.51 years. Majority of the patients 70 (74.5%) presented with >40 years of age. There were 54 (57.4%) males and 40 (42.6%) females. Mean duration of disease was 2.06 ± 0.33 years. Majority of the patients 60 (63.8%) presented with ≤2 years of duration of symptoms. Dyslipidemia was observed in 39 (41.5%) patients. Stratification was done with regards to age, gender and duration of disease of the patients. Post stratification results showed that dyslipidemia was more common in patients with thyroid disorder who were female and in those with age more than 40 years (tables-I to III).

Table-I: Comparison of dyslipidemia with age of the patients (n=94).

Age (years)	Dyslipidemia		*p*-value
	Yes	No	
≤40	6 (25)	18 (75)	0.057
>40	33 (47.1)	37 (52.9)	

Table-II: Comparison of dyslipidemia with gender of the patients (n=94).

Gender	Dyslipidemia		*p*-value
	Yes	No	
Male	18 (33.3)	36 (66.7)	0.062
Female	21 (52.5)	19 (47.5)	

Table-III: Comparison of dyslipidemia with duration of disease of the patients (n=94).

Duration of disease (yrs)	Dyslipidemia		*p*-value
	Yes	No	
≤2	25 (41.7)	35 (58.3)	0.963
>2	14 (41.2)	20 (58.8)	

DISCUSSION

Dyslipidemia is a frequent metabolic abnormality found in patient with thyroid disease, either in clinical or subclinical forms of the disease, and contributes to the end product of the effect of thyroid hormones in all aspects of lipid metabolism resulting in various quantitative and/or qualitative changes of triglycerides, phospholipids, cholesterol, and other lipoproteins. In general, hypercholesterolemia is associated with overt and subclinical hypothyroidism mainly due

to elevation of LDL cholesterol levels, whereas HDL cholesterol concentration is usually normal or even elevated[4]. Lipid profile is significantly raised in hypothyroid patients[5].

An Egyptian study enrolled 57 patients with hypothyroidism. Similar to our study they found out that 34% of patients with hypothyroidism had dyslipidemia. Like our study most of the patient (60%) were more than 40 years old. 82% of the patients were female in their study whereas in our study female were only 42%. unlike our study they also measured patients waist circumference, blood pressure and fasting blood sugar[7]. Similarly a study in Nepal enrolled 567 patients and found a positive co relation between dyslipidemia and thyroid disorders. Almost 40% of the patients with hypothyroidism were found to have dyslipidemia[8]. Whereas in our study we enrolled 94 patients and dyslipidemia was observed in 39% patients. In another study in India they studied lipid profile of hypothyroid patients. They had 2 groups, 25 patients with hypothyroidism and 25 patients with normal thyroid function. Like our study most of the patients were 40 years plus with female predominance. Similar to our study they also observed positive co relation between hypothyroidism and dyslipidemia[9]. However, the weak point of our study was that we did not have control group.

Dyslipidemia refers to elevation of plasma cholesterol, triglycerides (TGs), or both, or a low level of high-density lipoprotein (HDL) that contributes to the development of atherosclerosis, a precursor for ischemic heart disease (IHD)[10]. Atherogenic dyslipidemia is characterized by three lipid abnormalities: elevated serum TG, elevated small low-density lipoprotein (LDL) particles, And reduced serum HDL cholesterol[11]. The prevalence of dyslipidemia has shown varied results in different Indian studies. Some of the data are shown below[12]. The Indian Council of Medical Research project reported a prevalence of dyslipidemia of 37.5% among adults between age group of 15 to 64 years, with an even higher prevalence of dyslipidemia (62%) among young male industrial workers[13]. The common pattern of dyslipidemia seen in Asian Indians is different when compared to the lipid profile of White Americans[14]. In addition, Asian Indians tend to be physically more inactive (particularly children and young adults) and have excess truncal fat and increased intraabdominal fat accumulation. Majority of them consume diets rich in carbohydrate and low in ω-3 polyunsaturated fattyacids. All these factors are linked to insulin resistance, hypertriglyceridemia and consequent atherogenic dyslipidemia. There are studies which have shown that lipid metabolism is worsened by thyroid stimulating hormone level. The impaired lipid metabolism in the hypothyroid patients make them prone to atherosclerosis, blood pressure and cardiovascular diseases[15]. A pediatric study also revealed that lipid metabolism is affected by changes in thyroid hormones. This further increases cardiovascular diseases in children[16]. Another study from Pakistan enrolled 100 newly diagnosed hypothyroid patients. But unlike our study most of the patients were young. Also the prevalence of dyslipidemia in there study was much higher (91%) as compared to our study (39%). They concluded that hypothyroidism results in impaired lipid metabolisms which further increases the risk of cardiovascular diseases in this population[17]. Uniform national guidelines for screening for thyroid disease with serum TSH levels have not been established. The American Thyroid Association recommends screening by measurement of serum TSH beginning at the age of 35 years and every 5 years there after. The evidence in favor of screening is particularly compelling in women, but it can also be justified for men as a relatively cost-effective measure in the context of the periodic health examination. Persons with symptoms and signs potentially attributable to thyroid dysfunction and those with risk factors for its development may require more frequent serum TSH testing. The American College of Physicians acknowledges that though treatment for subclinical thyroid dysfunction is controversial, screening to detect thyroid dysfunction may be indicated in women older than 50 years[2]. Subclinical hypothyroidism

is relatively common among hypercholesterolemia patients. Thus, the measurement of serum TSH levels should be included in the screening of patients with dyslipidemia[18]. Hypercholesterolemic patients with sexual health (SH) may be treated with thyroxin substitution therapy since the restoration of euthyroidism can effectively lower the lipid levels, relieve certain symptoms and may prevent progression to overt hypothyroidism[19].

CONCLUSION

Significant number of patients with hypothyroidism in our study had dyslipidemia. Dyslipidemia was more common in women and frequency increased with increasing duration of disease.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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