Original Research Article

A study of lipid profile in patients with subclinical hypothyroidism: A tertiary care hospital study

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Abstract

Background: Dyslipidemia is thought to confer risk of cardiovascular disease development. Overt hypothyroidism is associated with lipid abnormalities. However, the relationship between subclinical hypothyroidism (SCH) and pattern of lipid abnormalities is unclear. The aim of this study was to assess lipid abnormalities in patients of subclinical hypothyroidism (SCH) and investigate relationship between lipid level and TSH. **Methods:** Serum lipid levels of 100 patients with subclinical hypothyroidism (SCH) and 100 age and sex matched euthyroid controls were evaluated in this cross sectional case control study. **Results:** In this study total cholesterol (TC) and low density lipoprotein cholesterol (LDL-C) were significantly elevated (p value<0.05) in patients with subclinical hypothyroidism (SCH) as compared to control group. Triglycerides (TG) and very low density lipoprotein cholesterol (VLDL-C) were also high in these patients as compared to control but the difference was not statistically significant. High density lipoprotein cholesterol (HDL-C) was marginally lower in these patients than control. **Conclusion:** Total cholesterol (TC) and low density lipoprotein (LDL-C) are higher in patients with subclinical hypothyroidism (SCH) as compared to euthyroid individuals. Other lipid like Triglycerides (TG) and very low density lipoprotein cholesterol (VLDL-C) may be marginally elevated whereas high density lipoprotein cholesterol (HDL-C) may be slightly reduced in these patients as compared to euthyroid individuals. There is also a positive correlation of LDL-C and TC with TSH level. As abnormal lipids are associated with development of cardiovascular diseases, lipid profile in these patients needs careful monitoring.

Keywords: Antithyroid peroxidase antibodies, Thyroid stimulating hormone, Free thyroxine, Atherosclerosis, Euthyroid

Introduction

Subclinical hypothyroidism (SCH) is defined as serum thyroid-stimulating hormone (TSH) level above the upper limit of normal despite normal levels of serum free thyroxine (FT4)[1]. Subclinical hypothyroidism is a common problem, with a prevalence of 3% to 8% in the population without known thyroid disease[2,3]. Hypothyroidism is one of the main causes of abnormal lipid metabolism [4,5]. Patients with overt hypothyroidism are at risk of hypertension, cardiovascular disease, and atherosclerosis[6]. Lipid abnormalities in overt hypothyroidism includes elevated total cholesterol (TC), low density lipoprotein cholesterol (LDL-C) and triglycerides (TG)[5].Although the association between subclinical hypothyroidism (SCH) and dyslipidemia is still controversial, changes in lipid profile in these patients have been observed in several studies[7-10]. Many studies have reported significant increase in TC, and LDL-C and TG in patients with SCH[11-13]. Present study aimed to find lipid abnormalities in patients of subclinical hypothyroidism (SCH) and investigate relationship between lipid level and TSH.

Materials and methods

This study was a cross sectional case control study carried out at Hassan Institute of Medical Sciences, Hassan. 100 patients of subclinical hypothyroidism (case) and 100 euthyroid controls were recruited from OPD of the hospital. Study was conducted during March 2018 to February 2020. Study was initiated after taking permission from institute ethical committee. Informed consent was taken from all participants before including in study.

Inclusion criteria

For cases

Individuals with raised serum TSH level (greater than 5.5 µIU/mL),normal Free thyroxine (T4) (0.89-1.76 ng/dL) and normal free triiodothyronine (T3) (2.30-4.20 pg/mL) levels.

For control

Age and sex matched subjects who have normal serum TSH level (0.35-5.5 µIU/mL), normal Free T4 (0.89-1.76 ng/dL) and normal free T3 (2.30-4.20 pg/mL) levels.

Exclusion criteria

1. Overt Hypothyroidism.
2. Pregnancy and lactation.
3. Nephrotic syndrome.
4. Dyslipidemia.
5. Hypertension and diabetes.
6. Malnutrition.
7. Smoking and alcohol.
8. Patient does not want to be a part of the study.

After detailed questionnaire and physical examination all participants were subjected to following investigations: fasting serum thyroid stimulating hormone (TSH), free thyroxin (T4), free triiodothyronine (T3), antithyroidperoxidase antibody (anti TPO), complete blood count (CBC), fasting plasma sugar, post prandial plasma sugar , Renal function test (serum urea and creatinine), liver function test (LFT) (serum bilirubin, albumin, SGOT, SGPT and alkaline phosphatase), 24 hour urinary protein, serum total cholesterol (TC), low density lipoprotein cholesterol (LDL-C),

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triglycerides (TG), high density lipoprotein cholesterol (HDL-C), very low density lipoprotein cholesterol (VLDL-C).

Statistical analysis

Statistical analyses were done using Microsoft excel and IBM SPSS statistics version 23.

Results

Out of 100 subclinical hypothyroidism, 87 were females and 13 were males. Total cholesterol was elevated in 60 cases and 10 controls. LDL cholesterol was elevate in 43 cases, TG was elevate in 12 patients and VLDL was elevated in 5 patients.

Discussion

Dyslipidemia is thought to confer risk of cardiovascular disease development [14,15]. Overt hypothyroidism is associated with dyslipedemia[16,17].However, the relationship between subclinical hypothyroidism (SCH) and abnormal lipid profile is still unclear. Among 8586 adults from the National Health and Nutrition Examination Survey III database, SCH was not associated with alterations in TC, LDL-C, TG, or HDL-C after adjustment for age, race, sex, and using lipid-lowering drugs. Vierhapper et al reported that there were no significant differences in serum TC, LDL-C, HDL-C, or TG between patients with SCH and the euthyroid control group[18].However, in our study high (p value <0.05) in SCH patients as compared to control group. TG and VLDL-C were higher in SCH patients as compared to control group but the difference was not statistically significant. HDL-C was marginally lower in SCH patients than control. Laway et al also observed significantly high Mean serum total cholesterol (TC), triglycerides (TG) and very low-density cholesterol (VLDL-C) in patients with SCH as compared to controls (P<0.05) [18].Similarly Asranna et al found significantly higher Mean total cholesterol and mean LDL-C levels in SCH as compared to controls; however they also observed that there was no significant difference in the mean HDL-C, VLDL-C, and TG between SCH and controls[18]. In our study LDL-C and TC were positively correlated with TSH level (p value<0.05) in patients of SCH.

Conclusion

Patients of SCH have higher TC and LDL-C than euthyroid individuals. Other lipid like TG, VLDL-C may be marginally elevated whereas HDL-C may be slightly reduced in these patients as compared to euthyroid individuals. There is also a positive correlation of LDL-C and TC with TSH level. As abnormal lipids are associated with development of cardiovascular diseases, lipid profile in these patients needs careful monitoring.

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