

Insulin resistance and lipid alterations in subclinical hypothyroidism

Atluri Sridevi, B. Vivekanand, G. Giridhar, A. Mythili, K. A. V. Subrahmanyam

Department of Endocrinology, Andhra Medical College, King George Hospital, Visakhapatnam, India

ABSTRACT

Introduction: It is known that dyslipidemia and increased insulin resistance were associated with overt hypothyroidism, but their association with subclinical hypothyroidism is conflicting. Aim was to evaluate insulin resistance and lipid alterations in subclinical hypothyroidism. **Methods:** Fifty consecutive cases of subclinical hypothyroidism are the subjects of the study. The cases are compared with age, gender and BMI matched controls. Lipid profile, insulin levels, FPG are assessed after overnight fast. Insulin resistance is calculated using HOMA-IR. The correlation between TSH& lipid profile, TSH & IR was assessed. **Results:** Total cholesterol (169.37 ± 32.83 vs. 154.5 ± 18.71 , $p=0.031$) & low density lipoprotein cholesterol (105.76 ± 26.92 vs 93.80 ± 16.67 , $p=0.037$) were significantly higher in cases compared to controls. High density lipoprotein cholesterol (44.23 ± 4.65 vs 42.26 ± 3.20 , $p=0.0507$) was lower in cases which showed a trend towards significance. Triglycerides (97.64 ± 39.44 vs. 92.96 ± 43.49 , $p=0.65$), fasting insulin levels (11.74 ± 7.16 vs 9.77 ± 5.54 , $p=0.211$) and Insulin resistance (2.30 ± 1.49 vs. 1.78 ± 1.09 , $p=0.11$) were elevated but did not differ significantly between the two groups. **Conclusion:** Subclinical hypothyroidism is associated with elevation of TC, LDL-C and non significant increase in TG and insulin resistance. Both lipid profile and insulin resistance did not correlate with severity of hypothyroidism.

Key words: Insulin resistance, dyslipidemia, subclinical hypothyroidism

INTRODUCTION

Subclinical hypothyroidism is defined as an elevated serum thyroid stimulating hormone (TSH) concentration of $>4.5 \mu\text{U/ml}$ in the presence of normal serum free T_4 . Its prevalence ranges from 4% to 21% and is much more common than that overt hypothyroidism.^[1] Cardiovascular risk is high in patients with hypothyroidism and is partly due to its association with risk factors like dyslipidemia and insulin resistance.^[2] However, the association of dyslipidemia and insulin resistance with subclinical hypothyroidism is conflicting. Few studies have found that individuals with subclinical hypothyroidism have dyslipidemia and increased insulin

resistance when compared to euthyroid subjects^[2,3] but other studies did not confirm this association.^[4]

Aim

To evaluate insulin resistance and lipid alterations in subclinical hypothyroidism

METHODS

The present study was done in the department of Endocrinology, Andhra Medical College, King George Hospital, Visakhapatnam. Subclinical hypothyroidism was defined as an elevated serum TSH concentration $>4.5 \mu\text{U/ml}$ in the presence of normal serum free T_4 ($0.82-1.7 \text{ ng/dl}$). All subclinical hypothyroid patients ≥ 18 years of age were included in the study. Patients with diabetes/impaired glucose tolerance, prior H/O of thyroid disease or thyroxine treatment or radiation, overweight and obese individuals, chronic infections or systemic illness, liver/renal/cardiac failure, alcoholics, pregnancy and subjects on drugs like O.C. pills, statins, anticonvulsants, glucocorticoids were excluded.

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DOI:
10.4103/2230-8210.104085

Corresponding Author: Dr. Atluri Sridevi, Room No. S10, Senior Resident Hostel, KGH Campus, Maharanipet, Visakhapatnam, Andhra Pradesh, India. E-mail: dratluri.s@gmail.com

Fifty six cases of subclinical hypothyroidism fulfilled the eligibility criteria. Control subjects were age, gender and body mass index matched. Blood sample was collected after an overnight fast of 8 h and TSH, FT4, lipid profile, insulin levels, FPG were assessed for both cases and controls. TSH and FT4 were assayed using chemiluminiscent method (Rosche kit). Total cholesterol, HDL-cholesterol, triglycerides were assessed using the enzymatic method and LDL-cholesterol was calculated using freidwald formula. Insulin was measured using chemiluminiscent assay (Rosche kit) and insulin resistance was calculated using the HOMA-IR.

Statistical analysis

Unpaired *t*-test and Pearson's correlation coefficient were used in statistical analysis as applicable.

RESULTS

The baseline characteristics: Mean age (32.92 ± 10.23 vs. 30.18 ± 9.79 years, $P = 0.15$) and BMI (21.46 ± 2.24 vs. 22.16 ± 1.93 , $P = 0.08$) were similar for both groups. Fifty five cases (98.3%) and 26 (96.7%) controls were females. Total cholesterol (169.37 ± 32.83 vs. 154.5 ± 18.71 , $P = 0.031$) and low-density lipoprotein cholesterol (105.76 ± 26.92 vs. 93.80 ± 16.67 , $P = 0.037$) were significantly higher in cases compared to controls. High-density lipoprotein cholesterol (44.23 ± 4.65 vs. 42.26 ± 3.20 , $P = 0.0507$) was lower in cases, which showed a trend towards significance. Triglycerides (97.64 ± 39.44 vs. 92.96 ± 43.49 , $P = 0.65$), fasting insulin levels (11.74 ± 7.16 vs. 9.77 ± 5.54 , $P = 0.211$) and Insulin resistance (2.30 ± 1.49 vs. 1.78 ± 1.09 , $P = 0.11$) were elevated but did not differ significantly between the two groups. There was no significant correlation between TSH and IR, TSH and lipid parameters.

DISCUSSION

Our subclinical hypothyroid patients were predominantly

females.^[4,5] The mean age was 32.92 years indicating that the prevalence of disease was more common in the middle age. TC and LDL-C were significantly higher in patients with subclinical hypothyroidism. This difference was also seen in the studies by Baskin *et al.*^[2] and Tournier *et al.*^[3] TG, insulin levels and insulin resistance were higher in these patients, but were not significantly different from controls and no correlation was found between the TSH levels and insulin resistance or lipid parameters as was seen in the studies by Tournier *et al.*^[3] and Luboshitzky.^[5] Subclinical hypothyroidism is associated with lipid abnormality, which is a risk factor for cardiovascular disease and needs to be addressed.

CONCLUSION

Subclinical hypothyroidism is associated with elevation of TC, LDL-C and non-significant increase in TG and insulin resistance. Both lipid profile and insulin resistance did not correlate with severity of hypothyroidism.

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Cite this article as: Sridevi A, Vivekanand B, Giridhar G, Mythili A, Subrahmanyam K. Insulin resistance and lipid alterations in subclinical hypothyroidism. *Indian J Endocr Metab* 2012;16:S345-6.

Source of Support: Nil, **Conflict of Interest:** None declared