P-0655– Study of serum leptin in prediabetic hypothyroid patients: relation to risk factors for coronary heart disease

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ABSTRACT

Background: Leptin is an adipocytokine that modulates metabolic processes, it reduces food intake & body adiposity and can improve insulin sensitivity. Hyperleptinaemia is a risk factor for coronary artery disease (CAD). Thyroid hormones play a major role in the maintenance of energy and lipid balance. Hypothyroidism is a common disorder that confers an increased cardiovascular risk. Also, prediabetes is associated with an increased risk of cardiovascular events. Clinical studies have demonstrated that adipocytokines play an important role in developing atherosclerotic cardiovascular diseases and that leptin may act as a mediator between obesity and CAD.

Aims: Assessment of the alteration of serum leptin in hypothyroid prediabetic patients and the relationship of this alteration to CAD risk factors.

Subjects and methods: 120 male patients were divided into 2 groups; Group A: 60 hypothyroid patients with normal glucose tolerance & Group B: 60 prediabetic hypothyroid patients. Group C: 60 healthy subjects. Complete clinical examination including waist circumference (WC) and blood pressure (BP). Fasting blood glucose (FBG), post prandial blood glucose (PPBG), basal serum cholesterol, triglycerides (TG), LDL, HDL, freeT3, freeT4, TSH, and fasting serum leptin level using ELISA assay were detected in all groups.

Results: Compared to controls, patients in group A had; significantly higher serum leptin (mean 11.50±4.79 ng/ml Vs 3.83±1.36 ng/ml, p=0.0001), cholesterol (mean 191.92±73.33 mg/dl Vs 133.61± 32.45 mg/dl, p=0.0001), TG (mean 158.95±42.894 mg/dl Vs 120.14±25.06 mg/dl, p=0.0001), LDL (mean 132.92±59.34 mg/dl Vs 76.44± 32.38 mg/dl, p=0.0001), and lower serum HDL (mean 28.96±6.03 mg/dl Vs 36.51±3.49 mg/dl, p=0.001). In group B serum cholesterol, TG, and LDL were significantly higher than in group A.

Conclusion: Serum leptin was significantly increased in hypothyroid patients with normal glucose tolerance and those with prediabetes. In all hypothyroid patients, leptin correlated positively with TSH, cholesterol, TG, LDL, and FBG, while it correlated negatively with FT3, FT4.

INTRODUCTION

Leptin is a 16 kDa cytokine that contains 167 amino acids and is produced by fat tissue. It is a proinflammatory adipokine that contributes to a low-grade inflammatory state in obese people. Leptin regulates hepatic gluconeogenesis & insulin sensitivity.(1) Increased circulating leptin, a marker of leptin resistance, is independently associated with insulin resistance and an early marker of cardiovascular disease.(2)

Thyroid hormones have profound effects on lipid metabolism, they are known to be the main regulators of total cholesterol (TC) and lipoprotein-cholesterol metabolism. Hypothyroidism can result in lipid abnormalities which increase the risk of endothelial dysfunction, hypertension and cardiovascular disease.(3)

Prediabetes is an intermediate metabolic state between normoglycaemia and diabetes. It includes those with impaired glucose tolerance and impaired fasting blood glucose. It has been demonstrated that prediabetes is associated with an increased risk of composite cardiovascular events, coronary heart disease, stroke, and all-cause mortality.(4)

AIM OF THE WORK

Assessment of the alteration of serum leptin in patients with hypothyroidism and normal glucose tolerance & hypothyroid patients with prediabetes and the relationship of this alteration to coronary artery disease risk factors in those patients.

PATIENTS AND METHODS

This study was carried out on 120 male patients divided into 2 groups: Group A: 60 patients with hypothyroidism and normal glucose tolerance, Group B: 60 patients with hypothyroidism and prediabetes. A third group; Group C: 60 healthy subjects with matched age & sex as control group. Exclusion criteria: Drug induced hypothyroidism, CAD, WC>102. All patients and controls were subjected to: History taking, complete clinical examination; including measuring BP and WC. Laboratory investigations; including routine: Complete blood count, liver & renal function tests and Specific investigations: FBG & PPBG, basal serum cholesterol, TG, LDL & HDL, serum Free T3, Free T4 & TSH, fasting serum leptin level using ELISA assay.

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RESULTS

Serum leptin was significantly increased in hypothyroid patients with normal glucose tolerance & those with prediabetes compared to controls.

In hypothyroid patients with normal glucose tolerance: Compared to controls, they had significantly high serum uric acid (mean 5.77±0.89 mg/dl Vs 4.622±0.83 mg/dl, p=0.0001), diastolic BP(DBP) (mean 83±13.29 mmHg Vs 78±8.56 mmHg, p=0.015) and WC (mean 97.57±2.17 cm Vs 92.58±4.63cm, p=0.0001). Serum leptin correlated positively with TSH (p=0.0001), cholesterol (p=0.0001), and DBP (0.026) while it correlated negatively with FT3 (p=0.0001) & FT4 (p=0.004).

In prediabetic hypothyroid patients: Serum cholesterol, TG & LDL were significantly higher than in hypothyroid patients with normal glucose tolerance. Serum leptin showed significant positive correlation with serum cholesterol (p=0.0001), TG (p=0.041) & LDL (p=0.036), and significant negative correlation with serum HDL (p=0.039).

	Group A (Hypothyroid id)	Group B (Hypothyroid prediabetic)	Group C (Control)	P1 P2 P3
Serum cholesterol (mg/dl)				
Range	88 - 370	133-370	81 - 199	0.0001
Mean±	191.92±	233.06±	133.61±	0.0001
SD	73.33	75.22	32.45	0.02
Serum TG (mg/dl)				
Range	41 - 260	80-253	48 - 150	0.0001
Mean±	158.95±	175.38±	120.14±	0.0001
SD	42.894	46.23	25.06	0.12
Serum LDL (mg/dl)				
Range	34 - 296	70-296	19 - 147	0.0001
Mean±	132.92±	163.81±	76.44±	0.0001
SD	59.34	67.19	32.38	0.04
Serum HDL (mg/dl)				
Range	23-54	14 - 54	24 - 45	0.05
Mean±	32.69±	28.96±	36.51±	0.0001
SD	7.08	6.03	3.49	0.02

P1 comparison between group A and C
P2 comparison between group B and C
P3 comparison between group A and B
P is significant if < 0.05

CONCLUSION

Serum leptin was significantly increased in hypothyroid patients with normal glucose tolerance and those with prediabetes. In all hypothyroid patients, leptin correlated positively with TSH, cholesterol, TG, LDL, FBG, while it correlated negatively with FT3, FT4. There was a direct relationship between serum leptin in hypothyroid prediabetic patients & some of the primary markers of metabolic syndrome. Thus serum leptin level may predict the development of CAD in hypothyroid patients with prediabetes.