Hospital Based Study of Metabolic Syndrome in Female Patients of Hypothyroidism.

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ABSTRACT

Background: Hypothyroidism was found to be associated with metabolic syndrome, with females being more at risk than males. The potential contributory role of the metabolic syndrome to cardiovascular risk and its scope in subjects with hypothyroidism is the focus of this study.**Methods:** Forty untreated hypothyroid women and forty normal, healthy subjects were recruited for the study. Fasting blood samples were collected for lipid profile, glucose and insulin level estimation.**Results:** Systolic and diastolic blood pressures in hypothyroidism patients were significantly higher than values in controls. Similarly, BMI, waist circumference was higher among hypothyroidism subjects. Again, fasting plasma glucose, total cholesterol, triglycerides and LDL-cholesterol levels were higher in patients with hypothyroidism in comparison to controls, while HDL- cholesterol, insulin, HOMA-IR were higher among controls. **Conclusion:** Hypothyroidism is significantly associated with metabolic syndrome and its components like dysglycemia, hypertension and dyslipidemia and obesity. Increased cardiovascular and other risk factor among hypothyroidism patients need to be addressed by further studies.

Keywords: Metabolic syndrome, Hypothyroidism, Cardiovascular risk.

INTRODUCTION

Metabolic syndrome is a cluster of risk factors characterized by hypertension, atherogenic dyslipidemia, hyperglycemia, prothrombotic and proinflammatory conditions.[1]

Thyroid function affects the parameters causing the metabolic syndrome, including low density lipoproteins, triglycerides, blood pressure and plasma glucose.[2]

The association between diabetes, obesity and hyperlipidemia is long known and has been termed "insulin resistance syndrome", syndrome" and metabolic syndrome by various researchers.[3]

The prevalence of thyroid dysfunction was reportedly more among women with metabolic syndrome.[4,5] In an Indian report, hypothyroidism was found to be associated with metabolic syndrome, with females being more at risk than males.[6]

Overt hypothyroidism is reported to be a recognized risk factor for atherosclerotic cardiovascular disease, hyperlipidemia, low-grade inflammation and hypercoagulability.[7,8] Therefore, the aim of study was to investigate the prevalence of metabolic syndrome among hypothyroid subjects and to assess cardiovascular risk factors in these patients.

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MATERIALS AND METHODS

The observational hospital based study was carried out in the department of medicine Katihar Medical College and Hospital, Katihar for a period of more than one and half year I, e. from November 2013 to July 2015 which was preapproved by the Ethical Committee of this institution review board. The patients attending the thyroid clinic as well as outdoor patients who fulfilled the diagnostic criteria as per WHO as well as ATP-III terms were included in the study. Based on thyroid profile, forty subjects and forty age-matched controls were included in the study. Any patient having significant renal disease, hepatic disease, or is immobile, or having a myocardial condition, or pregnancy was excluded from the study. After taking the history (especially of smoking, alcohol, physical activities, diabetes and hypertension), physical examination was conducted which include height, weight, BP, and abdominal girth. Then these patients were subjected to a complete haemogram with ESR, fasting blood sugar, complete lipid profile, ECG, fibrinogen level, T3, T4, TSH estimation and insulin level estimation. Metabolic syndrome was diagnosed when three or more of the following were present: Waist circumference more than 35 inch (women), Blood pressure > 130/85 mm Hg, plasma glucose > 100 mg/dL, triglycerides > 150 mg/dL, HDL-C < 50 mg/dl. Lipid profile of all participants was estimated by enzymatic methods[9,10] at day 0. Other routine investigation was also done. Data obtained were statistically analyzed using Student t test, assuming $P<0.05$ as significant.

RESULTS

Table 1: Clinical and biochemical characteristics of the hypothyroid and control groups.

Variables	Hypothyroidism Group(n=40)	Control Group(n=40)	" p" Value
Age	36.36±12.8	32.74±7.89	NS
BMI	27.64±3.6	26.12±2.8	0.03
Serum TSH(µIU/ml)	16.78±7.89	2.5±2.8	<0.0001
Serum T_3(nmol/ml)	1.1±0.6	2.9±2.68	<0.0001
Serum T_4(nmol/dl)	82.6±26.34	86.24±26.6	NS
Waist Circumference(cm)	84.1±11.3	79.65±10.6	NS
Systolic blood pressure(mmHg)	128.1±14.4	110.8±9.65	<0.0001
Diastolic blood pressure(mmHg)	86.1±10.6	78.1±8.6	<0.0004
Total Cholesterol(mg/dl)	179.8±32.89	156.83±24.66	<0.0007
Triglyceride(mg/dl)	167.6±48.62	102.8±28.7	<0.0001
LDL-C(mg/dl)	104.8±22.7	92.8±21.1	0.0166
HDL-C(mg/dl)	40.1±8.4	44.8±8.2	0.0133
Fasting glucose(mg/dl)	116.8±12.64	84.2±6.82	<0.0001
Insulin(µIU/ml)	9.06±6.52	11.12±6.54	NS
HOMA-IR	2.28±1.12	2.36±1.58	NS

"P" value<0.05 are considered significant. NS= Not significant

[Table 1] Shows Systolic and diastolic blood pressures in hypothyroidism patients were significantly higher than values in controls. Similarly, BMI, waist circumference was higher among hypothyroidism subjects. Again, fasting plasma glucose, total cholesterol, triglycerides and LDL-cholesterol levels were higher in patients of hypothyroidism in comparison to controls, while HDL- cholesterol ,insulin, HOMA-IR were higher among controls.

DISCUSSION

In our study, forty female subjects and age matched forty controls were included and study shows higher prevalence of hypertension, dyslipidemia and dysglycemia in hypothyroidism patients. The potential contributory role of the metabolic syndrome to cardiovascular risk and its scope in subjects with hypothyroidism was the focus of this study.

Abnormal lipid profile is an often-documented abnormality in thyroid disorders, and some reports[11] demonstrated that thyroid hormones influence LDL-C by various mechanisms, which include catabolism of LDL-C–independent alterations in metabolism, stimulation of the synthesis of cholesterol as well as the influence on biliary lipid metabolism. Well-documented lipid abnormalities in hypothyroidism include hypercholesterolemia and elevated LDL levels, but HDL-C levels may be normal or elevated in severe hypothyroidism.[12] Our study shows the prevalence of hypertension in hypothyroidism subjects which is similar to Saito *et al*.[13] Hypothyroidism is a potentially important but overlooked cause of hypertension, and possible pathophysiological mechanisms responsible for the occurrence of hypertension in hypothyroidism include changes in circulating catecholamines, their receptors and renin–angiotensin–aldosterone.[14] Higher BMI and central obesity were more common among hypothyroid subjects; central obesity has a role in the development of the metabolic syndrome and is reported to sometimes precede the appearance of other metabolic syndrome components.[15] Dysglycemia with higher fasting glucose, reduced concentration of insulin and HOMA-IR seen in hypothyroid subjects, which is similar to findings of Ohisen PM *et al*.[16] In subjects with hypothyroidism, insulin resistance is suggested as the possible underlying pathophysiological basis for glucose intolerance when present.[17] The metabolic syndrome, which is a set of lipid and non-lipid risk factors of metabolic origin linked to insulin resistance, is believed to be associated with an elevated risk for cardiovascular diseases.[18-20]

CONCLUSION

Our study revealed that hypothyroidism is significantly associated with metabolic syndrome and its components like dysglycemia, hypertension and dyslipidemia and obesity. Increased cardiovascular and other risk factor among hypothyroidism patients need to be addressed by further studies. Hypothyroidism and higher prevalence of metabolic syndrome among them needs careful assessment of risk factors by clinicians.

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