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Research Article

PREVALENCE OF METABOLIC SYNDROME AND ITS COMPONENTS IN WOMEN WITH SUBCLINICAL HYPOTHYROIDISM

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ABSTRACT

Objective: Thyroid dysfunction was found to be more common among women with metabolic syndrome. A cross-sectional analysis showed that subjects with subclinical hypothyroidism (SH) had high prevalence of cardiovascular disease than euthyroid subjects. The objective of the current study is to evaluate the prevalence of metabolic syndrome and cardiovascular risk factors among subclinical hypothyroid subjects.

Methods: Thirty untreated subclinical hypothyroid women and thirty normal healthy subjects were recruited for the study. Fasting blood samples were collected for lipid profile, glucose and insulin level estimation.

Results: Fasting plasma glucose, total cholesterol, triglycerides and LDL-cholesterol were found to be significantly increased in SH patients Both systolic and diastolic blood pressures were higher in the patient group. 43.3% of the SH patients were found to satisfy the criteria for metabolic syndrome.

Conclusion: In our study, subclinical hypothyroidism is significantly associated with metabolic syndrome and its components. Whether this association might be translated into a compounded cardiovascular risk needs to be evaluated by further studies.

Keywords: Subclinical hypothyroidism, metabolic syndrome, cardiovascular risk.

INTRODUCTION

Subclinical hypothyroidism is defined as an asymptomatic condition with high serum TSH levels and normal free thyroid hormone levels [1]. The rate of progression to frank hypothyroidism has been shown to be 2-5% per year being more prevalent in women and elderly people [2]. Metabolic syndrome is a cluster of risk factors characterized by hypertension, atherogenic dyslipidemia, hyperglycemia, prothrombotic and proinflammatory conditions [3]. Thyroid function affects the parameters causing metabolic syndrome including low density lipoproteins, triglycerides, blood pressure and plasma glucose. A higher prevalence of thyroid disorders is reported in type 2 diabetes mellitus [4].

The prevalence of thyroid dysfunction was reportedly more among women with metabolic syndrome [5, 6]. The prevalence of cardiovascular disease is 2-3 times higher in individuals with metabolic syndrome [7]. A cross-sectional analysis revealed that subjects with subclinical hypothyroidism had a significantly higher prevalence of cardiovascular disease than euthyroid subjects [8].

There is increasing evidence that both metabolic syndrome and subclinical hypothyroidism are associated with an increased cardiovascular risk. Data regarding the relationship between metabolic syndrome and thyroid function is conflicting. Hence, we undertook this study to examine the prevalence of metabolic syndrome among subclinical hypothyroid subjects and also to assess the traditional cardiovascular risk factors in these patients.

MATERIALS AND METHODS

Based on their thyroid profile, thirty untreated subclinical hypothyroid subjects and thirty age matched healthy women in the 20-60 years were recruited for the study from SRM Medical College Hospital and Research Centre. Cases with history of overt hypothyroidism, renal disease, cardiac disease, acute infection and liver disease were excluded from the study. The Institutional ethical committee approved the study and a written informed consent was obtained from the subjects.

Fasting blood samples were collected. The samples were centrifuged, separated and analyzed using Beckman Coulter autoanalyzer AU400 on the same day of collection. Serum levels of total cholesterol, HDL-C, triglycerides and plasma glucose were measured using enzymatic methods with reagents supplied by Beckman Coulter Inc., USA. Thyroid profile assay for selection of subjects was done by competitive enzyme immunoassay (Automated Immunoassay analyzer -360) from TOSOH Corporation, Japan.

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.

Statistical analysis was performed using SPSS software version 17. Student's t-test, chi-square test were used for comparison of qualitative data. Pearson correlation was used for the analysis of p value and correlation for scale variable. p value < 0.05 is considered significant. Data were defined as mean ± SD.

RESULTS

Clinical and biochemical characteristics of the study groups are given in Table 1. Systolic and diastolic blood pressures in subclinical hypothyroidism patients were significantly higher than values in controls. The two groups did not differ in waist circumference, HDL-cholesterol, insulin levels and HOMA-IR. Fasting plasma glucose, total cholesterol, triglycerides and LDL-cholesterol levels were significantly higher in SH group than in controls.

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

Variables	Subclinical hypothyroidism group	Control group	P value
Age	37.35±10.26	34.55±9.34	NS
BMI	25.1±4.56	24±3.2	NS
Serum TSH (μIU/mL)	7.51±1.21	2.23±0.32	<0.01
Serum FT_3 (pg/mL)	2.72±0.58	2.43±0.44	NS
Serum FT_4 (ng/dL)	0.92±0.14	0.82±0.12	NS

Waist circumference (cm)	82.8±12.4	81.5±10.2	NS
Systolic blood pressure (mm Hg)	127.6±15.8	108.3±9.12	<0.01
Diastolic blood pressure (mm Hg)	81.6±11.16	73.3±6.6	<0.01
Total cholesterol (mg/dL)	172.4±23.9	155.6±21.4	0.002
Triglycerides (mg/dL)	140.5±44.8	94.8±25.2	<0.001
LDL-C (mg/dL)	106.4±21.23	95.2±21.4	<0.05
HDL-C (mg/dL)	43.7±10.3	42.0±8.8	NS
Fasting glucose (mg/dL)	112.4±11.25	86.6±5.38	<0.001
Insulin (µIU/mL)	9.04±6.53	10.26±6.87	NS
HOMA-IR	2.24±1.58	2.35±1.45	NS

Data are expressed as mean ± SD. P value < 0.05 are considered significant. NS = Not significant

Bivariate analysis for metabolic syndrome in patients with subclinical hypothyroidism (Table 2) shows that 33.3% of patients in subclinical hypothyroidism groups have hypertension. A higher percent of SH group had metabolic syndrome than the comparison group (43.3% vs 6.66%, p=0.001). Dysglycemia is also more prevalent among SH group (53.3% vs 3.33%). Insulin and HOMA-IR did not differ between the groups. Hypertriglyceridemia was more prominent in SH patients.

Table2: Bivariate analysis for metabolic syndrome in patients with subclinical hypothyroidism

Variable	Subclinical hypothyroidism group	Control group	Statistical test
Metabolic syndrome	43.3%	6.66%	$X^2 = 10.76$ P=0.001*
Insulin resistance	56.6%	60%	$X^2 = 0.006$ P=0.39
Dysglycemia	53.3%	3.33%	$X^2 = 18.5$ P=0.001*
Waist circumference	43.3%	23.3%	$X^2 = 2.7$ P=0.1
Triglycerides	26.6%	3.33%	$X^2 = 6.41$ P=0.01*
Hypertension	23.3%	3.33%	$X^2 = 5.19$ P=0.02*

Data are expressed as percent of subjects with abnormal results

P value < 0.05 are considered significant.

Table 3 shows that a positive correlation exists between TSH levels and blood pressure, triglycerides and LDL-cholesterol.

Table3: Correlation between TSH and Lipid profile and blood pressure

	Systolic BP	Diastolic BP	Triglycerides	LDL-C
TSH	r=0.369 (p=0.04)*	r=0.39 (p=0.03)*	r=0.46 (p=0.001)*	r=0.84 (p=0.001)*

Correlation is significant at P value < 0.05

DISCUSSION

In our study, we demonstrated that women with subclinical hypothyroidism have significantly higher prevalence of hypertension, hypercholesterolemia, hypertriglyceridemia and dysglycemia. 43.3% of SH patients are having metabolic syndrome. On examining each component of metabolic syndrome among these patients - 23.3% had hypertension, 53.3% had dysglycemia, 43.3% had higher waist circumference, 26.6% had high triglycerides and 30% had decreased HDL-C levels. These findings are in concurrence with other studies which reported that SH would affect each component of metabolic syndrome including blood pressure and metabolism of carbohydrates and lipids [9, 10].

The thyroid hormones are known to play a role in regulating the synthesis, metabolism and mobilization of lipids. A significant increase in total cholesterol, triglycerides and LDL-C in SH patients in our study is in agreement with previous research [11, 12]. No correlation was found between total cholesterol and thyroid hormone levels whereas a positive correlation exists between TSH and triglycerides. 26.6% of SH patients had hypertriglyceridemia. There is increasing evidence indicating that elevated triglyceride levels are independent risk factors for cardiovascular disease. Hypertriglyceridemia and increased C-reactive protein levels were documented in SH patients, suggesting low grade inflammation and risk factors for developing cardiovascular disease. Our findings concur with recent studies demonstrating that 19-30% patients with SH have hypertriglyceridemia [13].

Subclinical hypothyroid patients in the present study had higher levels of LDL-C which positively correlated with TSH levels. The increase in LDL-C levels may be accompanied by increased formation of oxidised LDL-C contributing to enhanced risk of atherosclerosis [14]. Thyroxine replacement in these patients seems to have a beneficial effect by decreasing cardiovascular mortality by 9-31% [15, 16].

Both systolic and diastolic blood pressure has been found to be significantly increased in subclinical hypothyroid women. TSH levels were found to have a positive correlation with blood pressure. In a large population study, a positive linear association was established between systolic and diastolic arterial pressure and TSH levels [17].

Dysglycemia is more frequent among SH patients (53.3%). Dysglycemia has been characterized by the presence of cardiometabolic risk factors [18]. Insulin and HOMA-IR were not different between the groups. Muscle and adipose tissue are resistant to glucose uptake under the influence of insulin, whereas suppression of lipolysis by insulin is not impaired in hypothyroidism. Insulin resistance in muscle and adipose tissue was observed after stimuli but not in the fasting state. Decreased blood flow to these tissues might be one of the pathogenetic mechanisms for insulin resistance in these patients [19].

CONCLUSION

We have shown that subclinical hypothyroidism is significantly associated with metabolic syndrome and its components especially dysglycemia, hypertension and hypertriglyceridemia. The association of subclinical hypothyroidism with metabolic syndrome might result in a compounded cardiovascular risk which needs to be addressed by further studies. Therefore screening and treatment of metabolic syndrome may reduce the cardiovascular risk in these patients.

Conflict of interest: None

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