Subclinical Hypothyroidism and features of metabolic syndrome in Saudi elderly women

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OBJECTIVES

Metabolic syndrome (MetS) is characterized by a clustering of metabolic features that include central obesity, impaired glucose tolerance, dyslipidemia and hypertension. Individuals with MetS are at increased risk for diabetes mellitus (DM) and cardiovascular disease (CVD). The impact of thyroid hormone deficiency on glucose and insulin metabolism is not well understood. However, thyroid hormones play a role in lipid synthesis, metabolism and mobilization. Sub-clinical hypothyroidism (SCH) has been proposed to be a risk factor for low-grade inflammation, CVD, hypertension, and hyperlipidemia. Metabolic syndrome is a condition in which there are features that overlap those of hypothyroidism
Aim: To investigate the frequency of SCH in adults with MetS. To assess whether MetS features were associated with SCH.

METHODS

Study subjects were recruited from consecutive patients attending outpatient clinics within the department of internal medicine at KAUH, Jeddah city, KSA. The study was approved by the ethical committee in KAUH. A case-control study was conducted among 122 elderly women. Each patient was matched with a control whose age did not differ by more than 2 years. Demographic and medical data were obtained. SCH was defined as an asymptomatic condition with TSH >4.5 mIU/L with normal values for FT3 and FT4 (Jones et al.,2010). MetS was defined according to the American Heart Association (Grundy et al.,2005) as the presence of three or more of the following conditions: abdominal obesity (WC ≥88 cm), low levels of high density lipoprotein-cholesterol (HDL-C) (<50 mg/dl), hypertriglyceridemia (≥150 mg/dl), hypertension (systolic ≥130 mmHg, diastolic ≥85 mmHg), impaired blood fasting glucose (≥100 mg/dl). Subjects with a medical history of established thyroid disease, liver disease, renal insufficiency, previous diagnosis with CVD or DM type 2 were excluded from the study.
Body mass index was calculated from body height and weight. Waist circumference was measured initially at baseline and again at each follow-up phase, at the umbilical level, over light clothing, using an unstretched tape measure, without any pressure to body surface and measurements were recorded to the nearest 0.1 cm. Blood pressure was measured twice, after participants were seated for 15 min, using a standard mercury sphygmomanometer. Laboratory data were derived from fasting blood samples obtained from each participant after 12hrs fast. Laboratory tests performed included thyroid function tests (TSH, fT3, fT4), fasting blood glucose, lipid profile (triglyceride, low density lipoprotein cholesterol (LDL-C), HDL-C), serum insulin, and high sensitivity C-reactive protein (hs-CRP). Insulin sensitivity was assessed by 3 measures: Homeostasis Model Assessment-Insulin Resistance (HOMA-IR), Quantitative Insulin Sensitivity Check Index-I (QUICK-I), and McAuley indices.
Continuous data are presented as means ± standard error. Differences between subjects with and without MetS were determined by Mann-Whitney test and Chi square tests where appropriate. Univariate relationships were estimates by Spearman correlation analysis. The level of significance was set at two- sided p values <0.05. The data were analyzed using SPSS version 20.

Table (1): Clinical and biochemical characteristics of the study population (n=122)

	MetS (-) (N=61)	MetS (+) (N=61)	*p*
Age (years)	63.8±1.1	63.5±1.1	NS
Weight (kg)	70.5±2.1	79.7±1.8	<0.0001
Height (cm)	151.3±0.9	154.1±0.8	<0.01
Body mass index (Kg/m2)	30.7±0.8	33.6±0.7	<0.001
Waist circumference (cm)	93.3±1.5	106.1±1.9	<0.0001
Hip circumference (cm)	103.7±1.4	110.4±1.9	<0.01
Waist hip ratio	0.90±0.0	0.97±0.02	<0.0001
Systolic blood pressure (mmHg)	134.1±2.9	147.1±2.7	<0.01
Diastolic blood pressure (mmHg)	76.3±1.6	78.8±1.6	NS
Serum Total cholesterol (mmol/L)	4.63±0.1	4.65±0.1	NS
Serum Triglycerides (mmol/L)	1.29±0.07	2.31±0.2	<0.0001
Serum Low-density lipoprotein cholesterol (mmol/L)	2.55±0.1	2.39±0.1	<0.0001
Serum High-density lipoprotein cholesterol (mmol/L)	1.47±0.04	1.20±0.04	<0.0001
Fasting blood glucose (mmol/L)	6.0±0.4	8.52±0.5	<0.0001
Serum insulin (µU/ml)	12.1±1.2	17.7±1.7	<0.01
Homeostasis Model Assessment-Insulin Resistance	3.55±0.6	6.56±0.8	<0.0001
Quantitative Insulin Sensitivity Check Index-I	0.34±0.0	0.31±0.0	<0.0001
McAuley index	7.11±0.2	5.49±0.2	<0.0001
hs-C Reactive Protein (mg/L)	4.38±0.7	7.38±0.9	<0.01
Thyroid stimulating hormone (mIU/L)	2.97±0.5	3.06±0.3	NS
free tri-iodothyronine (pg/ml)	2.82±0.08	2.67±0.06	NS
free thyroxine (pmol/l)	13.3±0.52	13.4±0.3	NS

Data are expressed as means ± standard errors. Variables are compared by Mann-Whitney test

Table (2): Association between thyroid stimulating hormone and metabolic risk factors in the study population (n=122)

	r	*p*
Age (years)	0.241	0.007
Weight (kg)	-0.264	0.003
Body mass index (Kg/m2)	-0.247	0.006
Waist circumference (cm)	-0.183	0.044
Hip circumference (cm)	-0.250	0.006

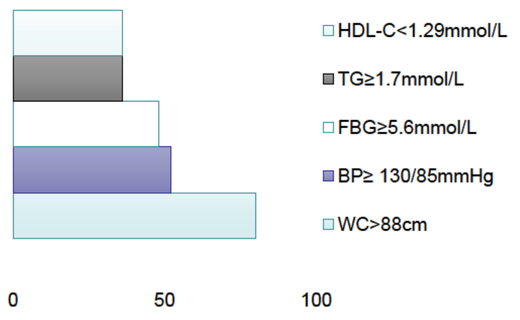

Figure (1): Prevalence of features of metabolic syndrome in individuals with SCH in the study population (n=122)

RESULTS

Clinical and biochemical characteristics of the study population are shown in Table (1). The prevalence of SCH was 26% in the MetS group and 15% in the control group (p>0.05). Although the two disease entities had some common biochemical markers, there were no significant relationships. The proportions of central obesity, impaired fasting glucose, hypertension, hypertriglyceridemia, and low HDL-C were 80%, 48%, 52%, 36%, and 36% in subjects with SCH (Figure 1). Table (2) shows the correlation of TSH levels with the variables related to CVD and MetS. The prevalence of SCH increased with age (r=0.241, p<0.01). All obesity measures were consistently inversely associated with serum TSH level.
Subjects with MetS had significantly higher levels of blood pressure, fasting blood glucose, fasting blood profile (except for HDL-C which was significantly lower), and serum insulin than their control counterparts (p<0.01). All anthropometric measurements and insulin resistance measures were lower in the control group than in MetS patients (p<0.01). CRP was higher in the MetS patients than their matching controls (p<0.01).

CONCLUSIONS

SCH is increased in patients with MetS, therefore hypothyroidism should be considered in newly diagnosed MetS patients. Of all MetS components, waist circumference was the only component negatively associated with serum TSH levels. Low-grade inflammation was more prevalent among the National Cholesterol Education Program-defined MetS patients than their age-matched controls.

References

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