RELATIONSHIP OF THYROID FUNCTION AND CENTRAL OBESITY

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INTRODUCTION:

Thyroid hormones control a vast of physiological processes, such as growth, development, basal metabolic rate, energy expenditure, contribute to appetite regulation therefore may have role in the development of obesity [1–4]. Clinical studies revealed that body mass index (BMI), waist circumference, arterial blood pressure and serum lipids are positively associated with levels of serum thyrotrophin (TSH) in euthyroid individuals [5–7]. The prevalence of metabolic syndrome increases with higher quartiles of TSH within the euthyroid range, mostly due to increasing rate of dyslipidaemia [8]. The main objective of the study was to investigate association between body mass index (BMI), waist circumference and measures of thyroid function among euthyroid adult women.

MATERIAL AND METHODS:

We analysed retrospective data of 119 euthyroid women participating in Lithuanian screening and prevention program for patients with high cardiovascular risk at Vilnius city Antakalnio outpatient clinic from Jul 2013 to Dec 2013. Glucose, lipid profile, TSH and, free-thyroxin (fT4) tests and ultrasound of thyroid gland records were investigated and thyroid gland volume was calculated using formula: *thyroid volume, mm³ = height, mm × width, mm × depth, mm × correction factor (as 0.524)*. Lipid accumulation product (LAP) index was calculated using formula: *LAP, cm*mmol/l = (waist circumference, cm – 58)* TG, mmol/l*.

We used SPSS version 20.0 for statistical analyses. A p value of < 0.05 was considered as significant.

RESULTS:

Mean patients age was 57.04 ± 4.56 years, body mass index (BMI) 28.86 ± 5.53 kg/m², waist circumference 88.40 ± 12.24 cm, LAP 44.02 ± 30.14 cm*mmol/l, TSH 1.81 ± 0.92 mIU/l, fT4 12.84 ± 2.89 pmol/l, and mean thyroid gland volume 14464.46 ± 6453.74 mm³.

36.1% of women were obese and 41.2% overweight (**Figure 1**).

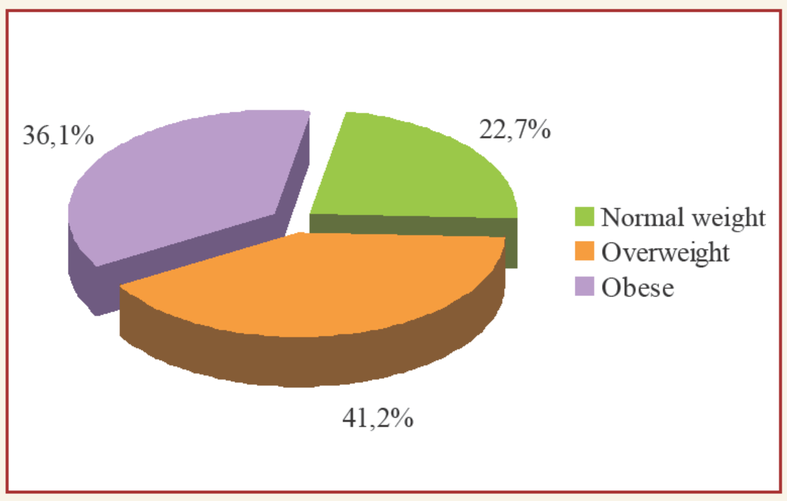

Figure 1. Distribution of women according to BMI.

Mean TSH, fT4 and thyroid volume did not differ between groups of obese, overweight and normal weight women (**Table 1**).

Table 1. Comparison of clinical variables, TSH, fT4 and thyroid gland volume in groups of normal weight, overweight and obese women, mean ± SD.

Variable	Normal weight, N=27	Overweight, N=49	Obese, N=43
Age, years	56.00 ± 4.77	57.31 ± 4.81	57.40 ± 4.11
BMI, kg/m²	22.52 ± 1.93[a,b]	27.22 ± 1.39[a,c]	34.72 ± 4.18[b,c]
Waist, cm	76.35 ± 7.45[a,b]	84.94 ± 6.25[a,c]	99.53 ± 9.00[b,c]
Waist-to-height ratio	0.46 ± 0.05[a,b]	0.52 ± 0.04[a,c]	0.61 ± 0.06[b,c]
LAP, cm*mmol/l	21.62 ± 13.99[a,b]	37.79 ± 21.49[a,c]	64.50 ± 31.99[b,c]
TSH, mIU/l	1.58 ± 0.99	1.83 ± 0.97	1.95 ± 0.79
fT4, pmol/l	13.72 ± 2.30	12.46 ± 3.49	12.42 ± 3.06
Thyroid volume, mm³	13543.55 ± 4884.00	13626.16 ± 7233.96	15869.49 ± 6454.07

LAP – lipid accumulation product index; TSH – thyrotrophin; fT4 – free-thyroxin; a – p<0.05 comparing normal weight and overweight groups; b – p<0.05 comparing normal weight and obese groups; c – p<0.05 comparing overweight and obese groups

TSH inversely correlated with thyroid gland volume (r=–245, p=0.044), fT4 (r=–0.471, p=0.042), and positively correlated with waist circumference (r=0.210, p=0.036), waist-to-height ratio (r=0.206, p=0.040) and BMI (r=0.184, p=0.045) (**Table 2**).

Table 2. Spearman correlations between TSH and clinical variables, fT4 and thyroid gland volume.

Variables	Correlation coefficient, r	p
BMI, kg/m²	0.184	0.045
Waist, cm	0.210	0.036
Waist-to-height ratio	0.206	0.040
LAP, cm*mmol/l	0.160	0.115
fT4, pmol/l	-0.471	0.042
Thyroid volume, mm³	-0.245	0.044

BMI – body mass index; LAP – lipid accumulation product index; TSH – thyrotrophin; fT4 – free-thyroxin

After adjusting for age, presents of diabetes and dyslipidemia significant positive association was observed between TSH and waist circumference (B=0.17, p=0.029) (**Figure 2**), and between TSH and waist-to-height ratio (B=2.52, p=0.040).

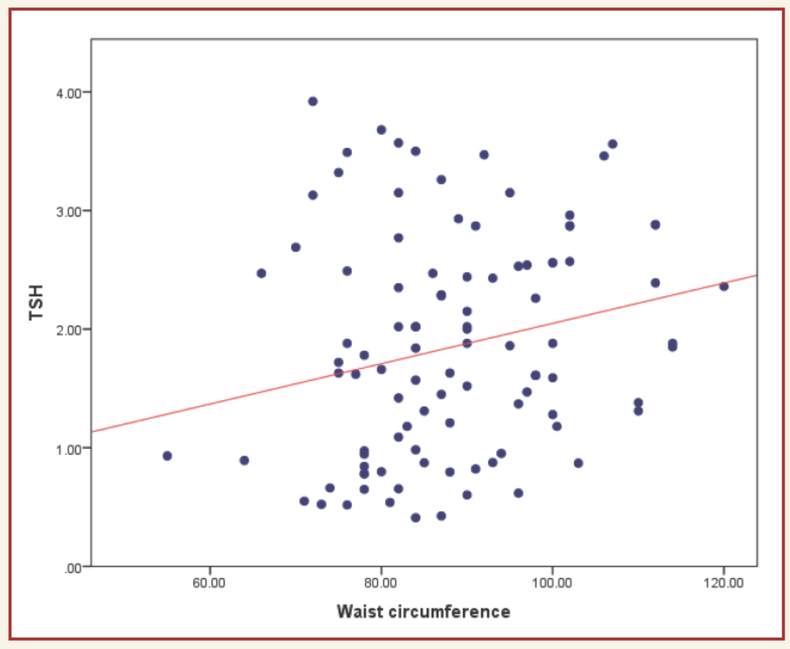

Figure 2. The relation between TSH and waist circumference.

CONCLUSIONS:

We found that measures of overall and central adiposity were associated with higher circulating levels of TSH in euthyroid women. Although weight loss and weight gain are well-known consequences of overt thyroid dysfunction, our results suggest that, within the euthyroid range, excess body weight and especially central obesity may induce changes in thyroid hormone levels.

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17th European Congress of Endocrinology, 16–20 May 2015, Dublin, Republic of Ireland

17 ECE 991--EP

Thyroid non-cancer

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DOI: 10.3252/pso.eu.17ece.2015

Poster presented at: ECE2015 16-20 May 2015 DUBLIN, IRELAND 17th EUROPEAN CONGRESS OF ENDOCRINOLOGY

PosterSessionOnline.com