Thyroid-stimulating hormone and premature atrial contractions in a young population

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Purpose

Thyroid disorders increase the risk for atrial fibrillation. However, the underlying mechanism of this association remains poorly understood. We therefore assessed the relationship between levels of thyroid-stimulating hormone (TSH) and frequency of premature atrial contractions (PACs).
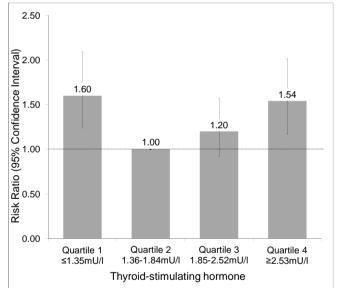
Methods

A population-based cohort study of healthy adults aged 25-41 years without prevalent cardiovascular disease, diabetes or body mass index >35kg/m² was investigated (GAPP-Study). The number of PACs per participant was obtained using a validated 24-hour electrocardiography (ECG) device. TSH was quantified from fasting venous blood samples. Multivariable negative binomial regression models were used to assess the relationship between TSH levels and the number of PACs.

Table 1 Baseline characteristics

n= 2049	Men (46.9%)	Women (53.1%)	p-Value
TSH, mU/l	1.84 (1.37; 2.47)	1.83 (1.32; 2.56)	0.91
PAC /hour	0.13 (0.04; 0.25)	0.13 (0.04; 0.33)	0.03
Age, years	37.0 (31.7; 40.5)	36.9 (31.3; 40.1)	0.24
BMI, kg/m²	25.6 (23.6; 27.9)	22.6 (20.6; 25.2)	<.0001
Current smokers, %	238 (24.8)	208 (19.1)	0.002
24h sys BP, mmHg	133 (127; 140)	120 (115; 126)	<.0001

Data are medians (interquartile range). TSH = thyroid-stimulating hormone; PAC = premature atrial beat; BMI= body mass index; sys BP= systolic blood pressure

Figure 1. Relationship between premature atrial beats and quartiles of thyroid-stimulating hormone

Data are risk ratios and 95% confidence interval. Adjusted for sex, age, body mass index, current smoking, hypertension, high- and low density lipoprotein, creatinine, hs-CRP, hemoglobin A1c, physical activity and alcohol consumption.

Table 2 Relationship between premature atrial beats and high and low thyroid-stimulating hormone levels

n= 2049	Risk Ratio (95% CI)	p-Value
TSH ≥ 4.1 mU/l	2.25 (1.62; 3.13)	<0.0001
TSH ≤ 0.8 mU/l	1.88 (1.25; 2.72)	0.001

TSH = thyroid-stimulating hormone; adjusted for sex, age, body mass index, current smoking, hypertension, high-and low density lipoprotein, creatinine, hs-CRP, hemoglobin A1c, physical activity and alcohol consumption

Results

2049 participants (median age 37 years) were included in this analysis, of which 46.9% were men. The median TSH (interquartile range (IQR)) was 1.84 (1.35; 2.52). Overall, 6.7% of the participants had a TSH ≥4.1 mU/l (reflecting subclinical hypothyroidism) and 4.5% had a TSH ≤0.8mU/L (reflecting subclinical hyperthyroidism), respectively. The median (IQR) PAC count per hour was 0.13 (0.04; 0.29). Results of the multivariable negative binomial regression analysis are shown in **Figure 1**. The relationship between PAC count and TSH levels was U-shaped, with the lowest risk in quartiles 2 and 3. Both subclinical hypothyroidism (risk ratio (95% confidence interval (95%CI)) 2.25 (1.62; 3.13), p<0.0001) and subclinical hyperthyroidism (risk ratio (95%CI) 1.88 (1.25; 2.72), p=0.001) were independently associated with PAC count **(Table 2)**.

Conclusion

We found a U-shaped relationship between TSH levels and PAC count in a population of young and healthy adults, suggesting that both hypo- and hyperthyroidism are related to the frequency of PAC occurrence.

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