

Downregulation of growth hormone in postural orthostatic tachycardia syndrome: insights from the SYSTEMA cohort

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Funding Acknowledgement: Type of funding source: Foundation. Main funding source(s): Crafoord Foundation, Swedish Heart and Lung Foundation

Background: Postural orthostatic tachycardia syndrome (POTS) is a variant of cardiovascular autonomic disorder occurring predominantly in young women. POTS is characterized by an excessive heart rate increase when assuming upright posture accompanied by symptoms of orthostatic intolerance. The pathophysiology of POTS has not been fully established and is believed to be multifactorial.

Purpose: We aimed to investigate the alterations in circulating growth hormone level in POTS.

Methods: We conducted an age-matched case-control study enrolling 42 patients with POTS (age 31±9 years; 36 women) verified by positive head-up tilt testing and cardiovascular autonomic tests, and 46 controls (32±9 years; 35 women) with negative active standing test and no history of syncope, orthostatic intolerance and endocrine disease. We measured plasma levels of growth hormone using a high-sensitivity chemiluminescence immunoassay in relation to presence of POTS diagnosis. All study participants completed the validated Orthostatic Hypotension Questionnaire (OHQ), consisting of two components: the symptoms assessment scale (OHSA) and daily activity scale (OHDAS) to evaluate the burden of symptoms. We applied standard statistical tests for group differences. Growth hormone values were log-transformed and standardized before the group comparison.

Results: POTS patients had significantly lower plasma levels of growth hormone (ng/mL) (median=0.53, IQR, 0.10–2.83 vs. median=2.33, IQR, 0.26–7.2, $p=0.04$) than controls. Levels of growth hormone were reversely related to OHDAS ($p=0.049$) among POTS patients. Supine heart rate was significantly higher in POTS patients (69.0±11.1 beats/min vs. 63.3±10.8 beats/min, $p=0.02$), as well as diastolic blood pressure (72.9±9.1 mmHg vs. 69.0±8.5 mmHg, $p=0.04$). We observed no significant difference in supine systolic blood pressure (116.6±13.3 mmHg vs. 115.2±10.0 mmHg, $p=0.60$). POTS patients had a significantly higher composite OHQ score than controls (60.0±18.6 vs. 4.2±7.5, $p<0.001$), as well as OHSA (36.2±10.0 vs. 3.6±6.4, $p<0.001$) and OHDAS (23.8±9.7 vs. 0.6±1.3, $p<0.001$).

Conclusion(s): Our study shows that patients with POTS have significantly reduced plasma levels of circulating growth hormone. Lower growth hormone levels among POTS patients are associated with increased impairment of daily life activities. Further studies are necessary to confirm our findings in the independent populations and explain the mechanisms behind this alteration.