Postural tachycardia syndrome associated with ferritin deficiency

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Introduction

- Postural Tachycardia Syndrome (POTS) is a condition caused by an underlying autonomic dysfunction.
- Adult patients suffering from POTS experience an increase in heart rate of greater than 30 beats per minute often accompanied by a drop in blood pressure when moving from a supine to upright position; adolescents exhibit an increase in heart rate greater than 40 beats per minute.
- The dysfunction of the sympathetic system leads to an insufficient cardiac and vascular tone upon standing and patients often present with frequent episodes of syncope and pre-syncope (Thibben, 2007).
- In a significant subset of POTS patients, no etiology can be identified.
- This study focuses on the potential connection between low serum ferritin, POTS and the prevalence of comorbid conditions.

Results

- Gender
- Mean Age
- SD
- Prevalence of common comorbidities relative to serum ferritin levels.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Female with POTS</th>
<th>Female without POTS</th>
<th>Male with POTS</th>
<th>Male without POTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headaches</td>
<td>Yes (18.2%)</td>
<td>No (51.7%)</td>
<td>Yes (20.0%)</td>
<td>Yes (85.7%)</td>
</tr>
<tr>
<td>GI distress</td>
<td>Yes (5.3%)</td>
<td>No (96.4%)</td>
<td>Yes (2.8%)</td>
<td>Yes (95.3%)</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Yes (4.5%)</td>
<td>No (99.3%)</td>
<td>Yes (2.4%)</td>
<td>Yes (94.6%)</td>
</tr>
<tr>
<td>Sinus arrhythmia</td>
<td>Yes (5.3%)</td>
<td>No (96.4%)</td>
<td>Yes (2.8%)</td>
<td>Yes (94.6%)</td>
</tr>
<tr>
<td>Migraines</td>
<td>Yes (4.5%)</td>
<td>No (99.3%)</td>
<td>Yes (2.4%)</td>
<td>Yes (94.6%)</td>
</tr>
<tr>
<td>Pulmonary symptoms</td>
<td>Yes (2.2%)</td>
<td>No (98.2%)</td>
<td>Yes (0.8%)</td>
<td>Yes (99.7%)</td>
</tr>
<tr>
<td>Peripheral neuropathy</td>
<td>Yes (15.9%)</td>
<td>No (86.3%)</td>
<td>Yes (2.8%)</td>
<td>Yes (95.3%)</td>
</tr>
<tr>
<td>Complaints of anxiety</td>
<td>Yes (33.3%)</td>
<td>No (66.7%)</td>
<td>Yes (2.8%)</td>
<td>Yes (95.3%)</td>
</tr>
<tr>
<td>Complaints of depression</td>
<td>Yes (13.3%)</td>
<td>No (86.7%)</td>
<td>Yes (2.8%)</td>
<td>Yes (95.3%)</td>
</tr>
</tbody>
</table>

Materials and methods

- Medical records of female patients with POTS (n = 33) and without POTS (n = 53) were reviewed for serum ferritin values and the presence of co-morbid conditions.
- All POTS diagnoses required positive tilt table testing results or head-up tilt (HUT) tests.
- Arithmetic mean serum ferritin values were calculated for both populations; a binomial two-tailed T-test was used to evaluate the statistical significance. Co-morbid conditions were tabulated for both cohorts. Lastly, we noted serum ferritin values <$50ng/mL.

Proposed Mechanism

Low iron stores, caused by a gut malabsorption issue (1) play a role in the extreme autonomic dysfunction observed in POTS. This creates a more hypoxic environment (2 & 3) leading to a more extreme and sensitive carotid body reflex (4). This reflex is triggered by a decrease in blood flow rate, resulting from a change in blood pressure, originally caused by a change in posture. Therefore, the observed increase in heart rate in patients with POTS during tilt table tests may be the result of low iron levels in the blood.

Literature cited


Conclusions

- Female patients with POTS have decreased serum ferritin levels compared to female patients without POTS who may also be suffering from autonomic dysfunction.
- Female patients with serum ferritin below 50ng/ mL are 2.8 times more likely to display POTS than females with serum ferritin above 50ng/mL.
- A link between low iron stores and the autonomic dysfunction exhibited in POTS may exist, depicted below.
- POTS patients are likely to exhibit a graded response to the severity of their autonomic dysfunction through an increase in the prevalence of comorbid symptoms, including: headaches, peripheral neuropathy, anxiety, concentration difficulty, GI distress.

Further information

Contact Daniel Wallman at dwallman@bu.edu or Dr. Anna Depold Hohler at Anna.Hohler@bmc.edu for further information.

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