The Relationship Between Iron Status, Limb Movements, and Sleep Architecture in Children

David G. Ingram MD  
*Children's Mercy Hospital*, dgingram@cmh.edu

Gaylyn Perry MD  
*Children's Mercy Hospital*, gvperry@cmh.edu

Zarmina Ehsan MD  
*Children's Mercy Hospital*, zehsan@cmh.edu

Baha Al-Shawwa MD  
*Children's Mercy Hospital*, balshawwa@cmh.edu

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THE RELATIONSHIP BETWEEN IRON STATUS, LIMB MOVEMENTS, AND SLEEP ARCHITECTURE IN CHILDREN

David G Ingram, MD, Galyn Perry, MD, Zarmina Ehsan, MD, and Baha Al-Shawwa, MD

Department of Pulmonary and Sleep Medicine, Children’s Mercy Kansas City, Kansas City, MO

Background

- Iron status is an important aspect of the evaluation of children with excessive limb movements during sleep.
- While there is clear data in adults to support this relationship, the data in children is less well established.
- We evaluated the association between iron status and limb movements during sleep in a large pediatric sample.

Methods

- This is a retrospective analysis of a single institution sleep program looking at all patients who underwent overnight polysomnogram and ferritin test within 24 hours of doing the sleep study between January 2015 and October 2017.
- Those with sleep apnea (Central Apnea Index >5/hr or Obstructive Apnea Hypopnea Index >2/hr) were excluded.

Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ferritin &lt;50 (n=386)</th>
<th>Ferritin &gt;/=50 (n=32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>5.5 (3.4)</td>
<td>6.5 (3.9)</td>
</tr>
<tr>
<td>N1</td>
<td>4.7 (2.9)</td>
<td>5.0 (2.5)</td>
</tr>
<tr>
<td>N2</td>
<td>42.1 (8.2)</td>
<td>45.9 (11.7)</td>
</tr>
<tr>
<td>N3</td>
<td>33.4 (8.1)</td>
<td>31.4 (9.8)</td>
</tr>
<tr>
<td>R</td>
<td>19.8 (5.4)</td>
<td>17.9 (6.6)</td>
</tr>
<tr>
<td>Total AI</td>
<td>9.8 (4.0)</td>
<td>10.2 (2.7)</td>
</tr>
<tr>
<td>Spontaneous AI</td>
<td>3.5 (3.3)</td>
<td>4.1 (2.3)</td>
</tr>
<tr>
<td>Limb movement AI</td>
<td>5.3 (2.6)</td>
<td>5.2 (2.0)</td>
</tr>
<tr>
<td>Limb movements</td>
<td>11.9 (7.5)</td>
<td>11.7 (6.9)</td>
</tr>
<tr>
<td>Total LMI</td>
<td>7.7 (3.4)</td>
<td>7.5 (2.7)</td>
</tr>
<tr>
<td>Periodic LMI</td>
<td>6.3 (3.6)</td>
<td>6.59 (3.9)</td>
</tr>
<tr>
<td>Single LMI</td>
<td>4.1 (5.7)</td>
<td>4.1 (6.0)</td>
</tr>
</tbody>
</table>

Results (cont)

- There were a total of 418 patients who qualified for inclusion. Mean age was 5.6 years (range 0–19 years).
- Overall, higher ferritin level was significantly associated with increasing age, increasing N2 sleep, lower REM sleep and lower single limb movement index but did not correlate with periodic limb movements of sleep.
- It appears that ferritin level at 30 nanograms per milliliter is the cutoff to make a difference in improving single limb movements (7.2+/-2.7 vs 7.9 +/- 3.6 for above and below 30 ng/ml, respectively).
- In multivariate regression modelling including single limb movement index and age, the association between ferritin and limb movements was no longer significant.

Conclusions

- Overall, there is a weak correlation between ferritin and single limb movements during sleep.
- However, it appears that age is an important possible confounding factor in the complex relationship between iron status and limb movements in children.