Unexpected Elevation of Ferritin in Anorexia Nervosa Patients

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Introduction

Many biochemical abnormalities are associated with Anorexia Nervosa (AN). Among these are aberrations of iron metabolism, in particular raised ferritin despite a presumably reduced iron intake. Ferritin is a large protein composed of 24-subunits which are a mixture of heavier and lighter (H&L) chains. The ratio of H:L depends on the tissue source of the ferritin. Some forms of ferritin (eg liver) contain much more iron than others. Serum ferritin, widely used to assess iron stores, is known to be raised in liver injury, malignancy, inflammation and infection, thus complicating its interpretation. Furthermore ferritin is also now thought to have significant non-iron storage roles including protection from oxidative damage. Given these roles the significance of perturbations in ferritin levels in disease states including AN is uncertain.

We confirm that elevated ferritin with marginally low transferrin in the absence of signs of infection or inflammation is quite common in AN patients. Therefore in a paediatric / adolescent population AN should be considered in interpreting raised serum ferritin concentrations.

Method

A registry of 72 consecutive patients with eating disorders presenting to the Women’s and Children’s Hospital from 2002 to 2012 was accessed. Records were reviewed for iron studies, LFTs, CRP and markers of inflammation.

A relative risk analysis was performed against all iron studies on ED adolescent population for whatever reasons between 2009 to 2011 inclusive. There was a total of 467 within this control group.

Results

Elevated ferritin is associated with increased ALT, ALP, GGT and MCV levels.

Relative Risk Analysis

<table>
<thead>
<tr>
<th>Control group</th>
<th>Elevated Ferritin (&gt;200ug/L)</th>
<th>Normal Ferritin (&lt;200ug/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>467</td>
<td>448</td>
</tr>
<tr>
<td>AN Group</td>
<td>72</td>
<td>54</td>
</tr>
</tbody>
</table>

Relative risk analysis shows that AN patients are 6 times more likely to have ferritin greater than 200 ug/L than a similar population without AN.

Discussion

We are unaware of the pathophysiology of this phenomenon, although several phenomena present in AN affect ferritin concentration:

- Ferritin may be elevated due to the catabolic nature of AN
- Refeeding syndrome may induce stress on hepatocytes, thus elevating hepatic and ferritin
- Ferritin may be elevated during periods of acute malnourishment
- Heparin, one of the key regulators of iron metabolism/homeostasis may be involved. Study by Papillard-Marchal et al. shows a correlation between elevated hepatic and ferritin levels in AN patients
- Despite reduced iron intake, iron deficiency is unlikely
- Pathophysiology beyond this may be a combination of the aforementioned factors

Conclusion

- Approximately half of AN patients present with some form of normal iron status
- When elevated ferritin is found in AN patients, it should be recognised as an unexplained but expected anomaly
- While the clinical significance of the finding is uncertain, healthcare professionals should be aware of this

References


