Evaluating the association between vitamin B12 deficiency and peripheral neuropathy in patients with diabetes

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Background

- Vitamin B12 or cobalamin is essential for DNA synthesis, red blood cell production, and neurological function.1,2
- Serum vitamin B12 concentration at which a person is considered to be deficient varies between studies and is set anywhere from <100-350 pg/ml.1,2
- Serum methylmalonic acid or homocysteine levels can be obtained to confirm diagnosis.1,2
- Causes of vitamin B12 deficiency include:1,2
  - Insufficient dietary intake
  - Gastric abnormalities
  - Small bowel disease
  - Pancreatic insufficiency
  - Medications
- Incidence of vitamin B12 deficiency: Ranges from 2.4% to 33% in patients with type 2 diabetes1
- Ranges from 45.5% to 54% in patients with type 1 diabetes2
- Studies describing the link between vitamin B12 deficiency and peripheral neuropathy in patients with diabetes are lacking and have produced conflicting results.1,2

Methods

- All patient records 2009-2013 with a diagnosis of DO or DPN and a serum vitamin B12 concentration n = 7,929

Objectives

- The objective of this study is to ascertain if there is an association between vitamin B12 deficiency and peripheral neuropathy in patients with diabetes

Results

Incidence of vitamin B12 deficiency and peripheral neuropathy

<table>
<thead>
<tr>
<th>DO</th>
<th>DPN</th>
<th>Total</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin B12 ≤ 250 pg/ml</td>
<td>361 (7.8)</td>
<td>36 (8.1)</td>
<td>647 (7.5)</td>
</tr>
<tr>
<td>Metformin</td>
<td>70 (11.9)</td>
<td>26 (12.5)</td>
<td>96 (12.5)</td>
</tr>
<tr>
<td>Proton pump inhibitors</td>
<td>127 (7.5)</td>
<td>41 (7.0)</td>
<td>168 (7.5)</td>
</tr>
</tbody>
</table>

Incidence of vitamin B12 deficiency based upon medication usage

<table>
<thead>
<tr>
<th>Medication(s)</th>
<th>NOS (%) of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>256/508 (50.6)</td>
</tr>
<tr>
<td>Proton pump inhibitors</td>
<td>168/220 (7.6)</td>
</tr>
<tr>
<td>Histamine-2 antagonists</td>
<td>329/517 (6.4)</td>
</tr>
</tbody>
</table>

Incidence of vitamin B12 deficiency based upon age

<table>
<thead>
<tr>
<th>Age</th>
<th>NOS (%) of Patients</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥ 60</td>
<td>323/758 (7.9)</td>
<td>404/817 (5.0)</td>
</tr>
</tbody>
</table>

Conclusions

- Vitamin B12 deficiency was not found to be associated with neuropathy in the general population with diabetes
- Metformin and age ≥ 65 were associated with decreased vitamin B12 concentrations
- Vitamin B12 deficiency was associated with an increased likelihood of neuropathy in patients with diabetes ≥65 years of age
- The ADA recommends evaluating vitamin B12 deficiency as a cause in patients with severe or atypical neuropathy; however, our findings show this is not supported in the general population
- Further studies are needed to assess whether or not patients with diabetes and peripheral neuropathy would benefit from vitamin B12 supplementation

References