A study to Evaluate PPI’s effect on vitamin D levels

Rani Hanna M.D., M.S. PGY-3
Joseph Grisanti, MD
The sunshine vitamin

• Existed over 500 million years.
• Prehormone, not only a vitamin.
• Two major sources:
  • Human skin due to sun light exposure
  • Food, supplement ingestion
• Fat soluble.
• Absorbed in the small intestine along with dietary fat.
Vitamin D deficiency

- Rickets.
- Muscle weakness and fall.
- Osteoporosis and fractures.
- Cancer.
- HTN and LVH.
- DM.
- Increased risk preeclampsia.
- The overall prevalence rate of vitamin D deficiency is 41.6%.

Proton pump inhibitors

• Progressively increased use over the past 25 years.
  • 113.4 million prescription
  • $7.2 billion in US sales
• PPI overutilization.
• 80% of PPIs in the US are purchased without either a prescription or physician evaluation of GERD.

• Drug Topics, 2012a, 2012b
PPI side effects

• Enteric infections including C-diff associated diarrhea.

• Pneumonia.

• Altered antiplatelet metabolism (e.g. Clopidogrel).

• Osteoporosis related fractures.


Side effect cont.

• Vitamins and minerals deficiencies.
  • Vitamin B12
  • Vitamin C
  • Calcium
  • Iron
  • Magnesium

• Cundy, Tim, Mackay. " *Current opinion in gastroenterology* 27.2 (2011): 180-185.
Purpose of study

• To evaluate the effect of proton pump inhibitors on vitamin D levels in patients who are treated for vitamin D deficiency or insufficiency.
Study Design

• Institutional Review Board (IRB) approval through Mercy Hospital of Buffalo.
• Study was conducted at Buffalo Rheumatology clinic in Buffalo.
• Subjects 18 years of age or greater.
• A 25(OH) vitamin D level between 10 and 30 ng/mL were considered for enrollment.
• A total of 249 subjects completed the study.
• Results were assessed by improvement in repeat serum 25(OH) vitamin D levels obtained following 12 weeks of replacement therapy.
• Subject received vitamin D supplements.
Study design cont.

- Duration of treatment was 12 weeks.
- Formal consent was obtained and signed by the patients.
- Demographics, vitamin D levels, medical history and medication list was obtained.
Study design cont.

- Out of 249 patients, 210 patients were included in the study.
- 70 patients were taking PPI at the time and during the study.
- 140 patients were not on any medications like (PPI, steroids, or anticonvulsants)
Inclusion Criteria

- Men and women were included.
- Age ≥18.
- Vitamin D levels ≥10 and <30ng/ml.
Exclusion Criteria

- Vitamin D levels below 10 ng/dl.
- Malabsorption syndrome.
- Intestinal bypass.
- Chronic liver or kidney disease.
- Sever SLE.
- Sever Scleroderma.
- History of cancer within the last 5 years.
End Points

• % increase in 25-OH vitamin D levels from baseline.
• Results were compared between the two groups.
Statistics

- Unpaired t-tests to compare two groups of subjects.
- P-value is less than 0.05 considered statistically significant.
## Demographics

<table>
<thead>
<tr>
<th></th>
<th>PPI</th>
<th>no PPI</th>
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<tbody>
<tr>
<td>Subjects</td>
<td>70</td>
<td>140</td>
</tr>
<tr>
<td>Gender</td>
<td>16M/54F</td>
<td>25M/115F</td>
</tr>
<tr>
<td>Age</td>
<td>57 ±12</td>
<td>51 ± 13</td>
</tr>
<tr>
<td>BMI</td>
<td>32±6</td>
<td>31±6</td>
</tr>
</tbody>
</table>
Mean vitamin D dose

P value 0.27

PPI

No PPI

Dose /mg

280000

306000
BMI

PPI

No PPI

P value 0.31

BMI range – kg/m²

32

31

BMI
Change in Vitamin D levels

<table>
<thead>
<tr>
<th></th>
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<th>no PPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1St. Vitamin D levels</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td>12 weeks</td>
<td>33</td>
<td>36</td>
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</tbody>
</table>
% increase in vitamin D levels

P value 0.006
Results

• The mean improvement in 25(OH) vitamin D levels for the “PPI” group was 40% with a mean raw difference of 9.5 (95% CI 7.2-11.9).

• “No PPI” group demonstrated a mean improvement of 60 % with a mean difference of 14.2 (95% CI 12.3-16.2).

• The improvement in 25(OH) vitamin D levels in the “no PPI” cohort was 49% greater than those taking a PPI. (p=0.006).
Proposed mechanism

- PPI’s
- Chronic gastric acid suppression
- Bacterial flora growth
- Nutritional malabsorption

References:
Limitations

• Study was not blinded.
• Single center study.
Recommendations

- Reevaluate the need for PPI.
- Regular vitamin D levels measurements.
- Further larger studies to be conducted.
Thank YOU!