BACKGROUND

While patients with cancer are known to be at increased risk of infection in part due to the immunosuppressing nature of cancer treatments, recent data indicate a particularly high risk for COVID-19 infection and poor outcomes.

Vitamin D may play an important role in COVID-19. A recent study demonstrated vitamin D deficiency may increase risk of COVID-19 infection, and a small randomized controlled trial in Spain reported significant improvement in mortality among hospitalized patients treated with calcifediol.1

METHODS

In this study, we performed a retrospective cohort analysis on patients with breast (female) or prostate (male) cancer or other cancers with reported vitamin D deficiency. Patients with an ICD-10 code for vitamin D deficiency or a Charlson-Deyo Index of ≥1 were included in the study. 12,390 patients who receive closer screening and follow up are more likely to be tested for and found to have COVID-19 infection if vitamin D deficient.

The breast cancer cohort consisted of 85% Whites, 13% Blacks, 6.6% Asians, 3.5% Hispanics, 1.9% Native Hawaiian or Other Pacific Islander, 0.1% American Indian or Alaska Native, and 0.1% other race/ethnicity. The prostate cancer cohort consisted of 83.1% Whites, 12.3% Blacks, 0.1% Asian, 0.1% Native Hawaiian or Other Pacific Islander, 0.1% American Indian or Alaska Native, and 0.1% other race/ethnicity. Our study suggests potentially vulnerable populations, such as breast and prostate cancer patients, may have an elevated risk of COVID-19 infection if vitamin D deficient.

CONTACT

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CONCLUSIONS

Our study suggests potentially vulnerable populations, such as breast and prostate cancer patients, may have an elevated risk of COVID-19 infection if vitamin D deficient.

Our study demonstrates the role of vitamin D as a prophylaxis or treatment for COVID-19.

Other cancer populations with reported vitamin D deficiency should be studied to evaluate their potential elevated risk for COVID-19 infection.

Vitamin D might play a role in other viral infections and would be important to assess given the increased vulnerability of cancer populations to secondary infection.

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2. Aaron Galaznik, MD MBA, Emely Rusli, MPH, Vicki Wing, MS, Rahul Jain, PhD, Sheila Diamond, MS, CGC, and David Ferguson, MD MBA MSc FCPP


4. A total of 16,287 breast cancer and 14,919 prostate cancer patients were included in the study (Figure 2).

5. Table 1: Patient Demographic and Clinical Characteristics

6. Figure 3: Odds Ratio Estimates: Vitamin D Deficiency and COVID-19 Infection

7. Future Directions for Research

Our study suggests potentially vulnerable populations, such as breast and prostate cancer patients, may have an elevated risk of COVID-19 infection if vitamin D deficient. Conclusions

- Unadjusted and adjusted modeling results establish that COVID-19 infection is higher among vitamin D deficient patients compared to non deficient patients, and that this association is independent of age, sex, race and ethnicity, and previous COVID-19 infection.5
- In a subgroup of patients with incident breast cancer (n=5,584), a significant association was found (adjusted OR=2.76 [95% CI: 1.53, 4.97]). In a subgroup of patients with incident prostate cancer (n=5,973), vitamin D deficiency was significantly associated with COVID-19 infection (p<0.05) (Figure 3).
- These results support previous findings demonstrating a relationship between vitamin D deficiency and COVID-19 infection in both cohorts, with statistical significance in both disease settings.
- The breast cancer cohort consisted of 85% Whites, 13% Blacks, 6.6% Asians, 3.5% Hispanics, 1.9% Native Hawaiian or Other Pacific Islander, 0.1% American Indian or Alaska Native, and 0.1% other race/ethnicity. The prostate cancer cohort consisted of 83.1% Whites, 12.3% Blacks, 0.1% Asian, 0.1% Native Hawaiian or Other Pacific Islander, 0.1% American Indian or Alaska Native, and 0.1% other race/ethnicity. Our study suggests potentially vulnerable populations, such as breast and prostate cancer patients, may have an elevated risk of COVID-19 infection if vitamin D deficient.

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Table 1: Patient Demographic and Clinical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Breast Cancer</th>
<th>Breast Cancer P&lt;0.05 (%)</th>
<th>Breast Cancer %</th>
<th>Prostate Cancer</th>
<th>Prostate Cancer P&lt;0.05 (%)</th>
<th>Prostate Cancer %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean, SD)</td>
<td>68.9±11.2</td>
<td>68.9±11.2</td>
<td>0.1%</td>
<td>73.6±10.0</td>
<td>73.6±10.0</td>
<td>0.1%</td>
</tr>
<tr>
<td>Sex (n, %)</td>
<td>7,982/48.0%</td>
<td>7,982/48.0%</td>
<td></td>
<td>12,390/64.9%</td>
<td>12,390/64.9%</td>
<td></td>
</tr>
<tr>
<td>Race (n, %)</td>
<td>White 85.0%</td>
<td>85.0%</td>
<td></td>
<td>Black 9.6%</td>
<td>9.6%</td>
<td></td>
</tr>
<tr>
<td>Diabetes (n, %)</td>
<td>33.0%</td>
<td>33.0%</td>
<td></td>
<td>4.8%</td>
<td>4.8%</td>
<td></td>
</tr>
<tr>
<td>COVID-19 (n, %)</td>
<td>83.6%</td>
<td>83.6%</td>
<td></td>
<td>2.3%</td>
<td>2.3%</td>
<td></td>
</tr>
<tr>
<td>Median Quan's Charlson Comorbidity Index</td>
<td>49</td>
<td>49</td>
<td>0.1%</td>
<td>83</td>
<td>83</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

Table 2: Odds Ratio Estimates: Vitamin D Deficiency and COVID-19 Infection

<table>
<thead>
<tr>
<th>Odds Ratio (95% CI)</th>
<th>Breast Cancer</th>
<th>Breast Cancer P&lt;0.05 (%)</th>
<th>Breast Cancer %</th>
<th>Prostate Cancer</th>
<th>Prostate Cancer P&lt;0.05 (%)</th>
<th>Prostate Cancer %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin D deficiency</td>
<td>2.384</td>
<td>14.6%</td>
<td>1,730</td>
<td>1,730</td>
<td>1,730</td>
<td>1,730</td>
</tr>
</tbody>
</table>

Figure 1. Study Timeline

Figure 2. Patient Attrition

Figure 3. Odds Ratio Estimates: Vitamin D Deficiency and COVID-19 Infection

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