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RESEARCH ARTICLE

SARS-CoV-2 positivity rates associated with circulating 25-hydroxyvitamin D levels

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Abstract

Oral treatment and testing for coronavirus disease 2019 (COVID-19) become widely available, other methods of reducing infection also should be explored. This study used a retrospective observational analysis of deidentified data performed at a national clinical laboratory to determine if circulating 25-hydroxyvitamin D (25(OH)D) levels are associated with severe acute respiratory disease coronavirus 1 (SARS-CoV-2) positivity rates. Over 100,000 patients from all 50 states with SARS-CoV-2 results performed from March through mid-June 2020 and matching 25(OH)D results from the preceding 12 months were included. Residential zip code data was matched with zip code Census data and perform analyses of seropositivity proportions and odds. A total of 39,770 patients were included (median age 50 years [interquartile range (IQR) 44–57], 80% female). The SARS-CoV-2 positivity rate was 0.2% (95% CI: 0.2–0.2%) and the mean seasonally adjusted 25(OH)D was 31.7 (SD 11.7). The SARS-CoV-2 positivity rate was higher in the 26,790 patients with “adequate” 25(OH)D values (≥30 ng/mL; 0.23%, 95% CI: 0.23–0.23%) than in the 27,870 patients with “inadequate” values (<30 ng/mL) (0.1%, 95% CI: 0.1–0.1%). The association between 25(OH)D levels and SARS-CoV-2 positivity was best fitted by the weighted second-order polynomial regression, which indicated strong correlation in the total population ($R^2 = 0.96$) and in analyses stratified by all studied demographic factors. The association between lower SARS-CoV-2 positivity rates and higher circulating 25(OH)D levels remained significant in a multivariable logistic model adjusting for all included demographic factors (adjusted odds ratio 0.280 per ng/mL increment, 95% CI: 0.080–0.880, $p < 0.01$). SARS-CoV-2 positivity is strongly and inversely associated with circulating 25(OH)D levels, a relationship that persists across adjusted, seasonally-specific, both sexes, and age ranges. Our findings provide impetus to reevaluate the role of vitamin D supplementation in reducing the risk for SARS-CoV-2 infection and COVID-19 disease.

Figures

