

Original Research

SARS-CoV-2 Antibody Positivity and Prevalence in an Outpatient Medical Setting in Las Vegas, NV

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Abstract

Background

SARS-CoV-2 antibody testing shows the prevalence of COVID-19 disease in different communities and has epidemiological significance.

Methods

SARS-CoV-2 IgM and IgG were tested in 319 patients, staff and visitors of a primary care clinic in Las Vegas, NV on a continuous as-requested basis.

Results

Prevalence of SARS-CoV-2 antibodies was 3.76% in a primary care office in Las Vegas, NV. Positivity of IgM was 0.31% and IgG 3.44%. The most common symptoms reported amongst those who tested positive were cough, shortness of breath and loss of smell and taste. The most common comorbidities included hypertension, chronic lung disease, seasonal allergies, and type 2 diabetes mellitus, in that order.

Conclusion

Prevalence was 2.3% in Washoe County, NV in June 2020 and 3.76% in Clark County, NV in April–June 2020. This has important implications for heavily populated urban areas.

Keywords

SARS-CoV-2; COVID-19; prevalence; antibody testing; SARS-CoV-2 IgG; SARS-CoV-2 IgM; seroepidemiologic studies; viral antibodies; coronavirus infections; pandemics; serologic tests

Background

One priority for the Centers for Disease Control (CDC) and The US Department of Health and Human Services (HHS) has been to track Coronavirus Disease 2019 (COVID-19) infections to determine how much of the US population is infected over time. A variety of surveillance systems are in place to track COVID-19 cases based on those who seek medical care. However, these systems can miss infections that occur in people who have mild symptoms or are asymptomatic.^{1,2}

As of November 6th, 2020 more than 9.6 million people have been infected with the virus in United States with 234,927 fatalities. There have been nearly 105,360 confirmed cases and

over 1,824 deaths in Nevada.³ By using a positive serology as the prevalence measure, we can estimate the total number of people that have been infected, including those infections that might have been missed. These surveys also can help determine how much of the population has not yet been affected, promoting public health officials' plans for future health-care needs. One final benefit is that infections can be monitored as they progress through the population over time. This is done by taking "snapshots" of the percentage of people who have antibodies against Severe Acute Respiratory Syndrome Coronavirus Type 2 (SARS-CoV-2) at different time points. Our goal was to estimate the seroprevalence of the local population by testing patients in an outpatient internal medicine clinic in Las Vegas, NV.^{4,5}

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Methods

In one outpatient internal medicine setting in Las Vegas, NV, SARS-CoV-2 testing was verbally offered by front desk staff to every single patient, visitor, relative, staff and resident who presented to the office from April–June 2020. There were no exclusion criteria. Testing was completely voluntary. Almost all people agreed to have the test done and even volunteered their children for the test as well. Subjects were tested on-site, and the results were given to them in 10–15 minutes.

Testea Biotechnology makes the test used in Hangzhou, China. (Hangzhou Biotest Biotech COVID-19 IgG/IgM Rapid Test Cassette Developer) (Biotest Biotech Test: COVID-19 IgG/IgM Rapid Test Cassette) (Technology: Lateral flow, Target: Spike). The IgG/IgM test cassette is a qualitative membrane-based immunoassay for the detection of IgG and IgM antibodies in whole blood. When blood is applied to the cartridge (pin-prick from a finger), a colored line appears in the respective test line. This was done by a qualified registered nurse in our study. To serve as a procedural control, a colored line will always appear in the control line region, indicating the proper volume of specimen has been added, and membrane wicking has occurred. The sensitivity of the IgG result is estimated to be at 96%, and specificity is at 100% when compared to commercial polymerase chain reaction (PCR) testing. PCR test have been performed by outside laboratories for some of the cases prior to our testing. We did not perform any corroboration separately by virus antigen or PCR.

Descriptive statistics were used to examine the distribution of the outcomes and predictors. Means and standard deviation or their alternatives were computed for continuous variables and percentages for categorical variables.

Results

Between April–June 2020, 319 tests were administered. Subject ages ranged from 3 to 92 with a median age of 56.6. Of those tested, 1% were between 1–9 years old, 1.5% between 10–19, 4% between 20–29, 13% between 30–39, 12% between 40–49, 16% between 50–59, 19.5% between 60–69, 18.8% between 70–79, 8.5% between 80–89 and 2% between 90–99. The

subjects were 166 females (52%) and 153 (48%) males.

Of the 319 tests completed, 12 (3.76%) have positive tests. 11 (3.44%) tested positive for IgG antibodies, 1 (0.31%) tested positive for IgM antibodies only, and 3 (0.94%) tested positive for both IgG and IgM. IgG shows immunity, and IgM shows an active infection. The combined IgG and IgM possibly indicates a case that was active and was getting protection at that time.⁶

Positive cases consisted of 4 females (33.3 %) and 8 males (66.6 %). The youngest person who tested positive was 44, and the oldest person was 86, with a mean age of 61 years. Four people identified potential places that they had been exposed to the virus, including a golf course, a resort in Laughlin, NV, a busy grocery store and a busy drug store. These obviously cannot be independently confirmed. Subjects ranged in employment history and exposure risk.

Cases had self-reported comorbidities: 5 (41%) were hypertensive, 3 (25%) had chronic lung disease, and another 3 had seasonal allergies, 2 (16.6%) had diabetes and another 2 autoimmune conditions (Sjogren's syndrome and rheumatoid arthritis), 1 (8.3%) person each had cardiovascular disease, chronic liver disease, vitamin D deficiency or were a smoker. (**Table 1**) Three positive cases were on angiotensin-converting enzyme inhibitors or angiotensin receptor blockers for hypertension.

Five people with positive IgG antibodies had positive prior PCR testing for SARS-CoV-2 in the previous weeks or months. Of those, 2 people had positive IgM as well. One person had negative PCR earlier (approximately 2 weeks ago) but a positive antibody test, and another person had a positive PCR earlier (about 3 weeks) with a current negative antibody test. Four of the positive cases had no symptoms (33.3%), and 9 had symptoms (66%). Symptoms lasted from 6–30 days with an average of 10 days. Symptoms were cough in 6 (66%), loss of smell in 4 (41%), fever in 3 (33%), loss of taste in 3 (33%), shortness of breath in 3 (33%), fatigue in 2 (25%), diarrhea in 2 (25%), chills in 1 (16.6) and chest discomfort in 1 (16.6%). Nobody reported rigors, runny nose, sore throat, loss of appetite, headache, nausea or vomiting.

Table 1. Co-morbidities in patients with a positive test.

Co-morbidities		Number of co-morbidities	
Hypertension	41%	6	One patient
COPD	25%	4	One patient
Seasonal allergies	25%	3	Two patients
Diabetes	16.6%	2	One patient
Autoimmune diseases	16.6%	1	Three patients
Cardiovascular diseases	8.3%	0	Four Patients
Vitamin D deficiency	8.3%		
Chronic liver disease	8.3%		

Discussion

As of November 6th, 2020, the Southern Nevada health district has reported 86,673 cases and an upward trend. Nevada was in the red zone for cases, indicating more than 100 new cases per 100,000 population per week, and the red zone for test positivity, indicating a rate above 10%. At one point in July, Nevada had 173 new cases per 100,000 population, compared to a national average of 119 per 100,000.⁷

In a study done in Reno, NV, in June 2020, the prevalence was estimated at 2.3%. In that study in Washoe County, 1,270 households from within 128 unique census blocks were used and 234 people from those agreed to provide blood samples for antibody testing.⁸ In contrast, our study revealed a 3.76% prevalence in Las Vegas during almost the same time period. This can be the difference between a more urban area with a less urban one or just a sign of progression and spread of the disease.

Seroprevalence studies such as this study can be a useful asset to both the community and state health departments, as well as the CDC. With such surveys we can learn about the total number of people that have been infected, infections that might have been missed, and assist with estimations of how much of the population has not yet been infected. Herd immunity can be achieved on average if more than 60–70 percent of the population have been exposed.⁹ Cases in Las Vegas have declined since peaking in mid-July. There has been a move toward community-led neighborhood testing. Surge testing and contact tracing resources have been allocated to neighborhoods and zip codes with the highest case rates. Laboratory turnaround times have decreased from many days to 2–3 days in several states like AZ.¹⁰

Results can help identify areas where to more aggressively implement community mitigation strategies. Community-level estimates can complement case-based and syndromic surveillance as a tool to understand local transmission and the extent of past infection in a population. The relatively low seroprevalence estimate in this report suggests that most persons in the catchment area had not been infected with SARS-CoV-2 by early October. There has been a relative paucity of community-based studies conducted but their utility may increase as planned phases of re-opening progress.

Limitations

One limitation of our study was the testing bias. We performed the test by consent and acceptance of subjects and did not test all in a blinded fashion. Timing of the test in April–June might also have an effect on the overall results. We assumed 100% accuracy for our test (the sensitivity was actually reported at 96% for the test) and no confirmatory tests were done to corroborate for false positives or false negatives. Also the positive antibody tests results were limited, which makes drawing a definitive conclusion a bit difficult.

Conflicts of Interest

The authors declare they have no conflicts of interest.

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