Original Research Article

Antibodies to SARS-CoV2 detectable for less than 50 days in polymerase chain reaction confirmed COVID-19 patients

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Received: 11 August 2020
Revised: 20 August 2020
Accepted: 21 August 2020

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ABSTRACT

Background: A seroprevalence study for COVID-19 antibodies was conducted amongst health workers in Mumbai, India, in June 2020.

Methods: Healthcare workers (n=801) underwent a cross sectional survey through electrochemiluminescence immunoassay (Roche diagnostics’ Elecsys anti-SARS-CoV-2 assay, Roche diagnostics, Rotkreuz, Switzerland).

Results: Of the 801 healthcare workers, 62 who had been previously diagnosed with a real time-polymerase chain reaction (RT-PCR) proven SARS-CoV-2 infection, 45 (73.6%) were found to be seronegative during the study. The duration between the positive RT-PCR test and the serological testing ranged from 15 to 49 days for 34 (54.8%), and was >50 days in 28 subjects. Up to 28 days after a positive PCR test, 90% of the subjects were found to be seropositive, but this reduced to less than half over the next two weeks (38.5% between 29 and 42 days).

Conclusions: Our findings are in agreement with previous reports that demonstrate a peak antibody formation after 3 weeks, and also an early antibody decay that is almost exponential. This may also have a significant effect on the protection vaccines are able to provide considering that a natural infection has such a transient antibody response.

Keywords: Real time-polymerase chain reaction confirmed, COVID-19, Seroprevalence, Antibodies

INTRODUCTION

The efficacy of possible COVID-19 vaccines, the validity of ‘immunity passports’ and the duration of public health interventions, including social distancing, have all come into question following recent studies on the transient nature of antibody-mediated immunity.¹⁴

The objective of the study was to detect severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) antibodies polymerase chain reaction (PCR) confirmed COVID-19 patients.

METHODS

As part of a cross-sectional seroprevalence study in Mumbai, India, conducted in June 2020, 801 healthcare workers underwent an electrochemiluminescence immunoassay (Roche diagnostics’ Elecsys anti-SARS-CoV-2 assay, Rotkreuz, Switzerland). All health care workers (HCWs) engaged in three government run hospitals were included in the study after informed consent. Testing was a part of hospital policy. The study was cleared by the Institutional review board of the JJ Group and Grant Medical College, Mumbai, India. Results were presented as percentages.
RESULTS

Of 801, 62 HCWs who had been previously diagnosed with a RT-PCR proven SARS-CoV-2 infection, 45 (73.6%) were found to be seronegative during the study. The duration between the positive RT-PCR test and the serological testing ranged from 15 to 49 days for 34 (54.8%), and was >50 days in 28 subjects (Table 1).

Up to 28 days after a positive PCR test, 90% of the subjects were found to be seropositive, but this reduced to less than half over the next two weeks (38.5% between 29 and 42 days). This reduced further to less than 15% for subjects who were tested between 43 and 49 days of their positive RT-PCR. None of the 28 infected HCWs who had had the RT-PCR more than 50 days ago tested positive for the antibodies.

Table 1: Duration between positive RT-PCR test and serological test for SARS-CoV-2.

<table>
<thead>
<tr>
<th>Time interval between positive PCR test and serological test (days)</th>
<th>Number</th>
<th>Antibody negative</th>
<th>Antibody positive</th>
<th>Percentage seropositive</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-21</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>50.0</td>
</tr>
<tr>
<td>22-28</td>
<td>10</td>
<td>1</td>
<td>9</td>
<td>90.0</td>
</tr>
<tr>
<td>29-42</td>
<td>13</td>
<td>8</td>
<td>5</td>
<td>38.5</td>
</tr>
<tr>
<td>43-49</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>14.3</td>
</tr>
<tr>
<td>≥50</td>
<td>28</td>
<td>28</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

DISCUSSION

Our findings are in agreement with previous reports that demonstrate a peak antibody formation after 3 weeks, and also an early antibody decay that is almost exponential. Long et al reported that 40% of asymptomatic infected individuals became seronegative and 12.9% of the symptomatic group became negative for immunoglobulin G (IgG), 8 weeks following discharge from hospital (defined as the early convalescent phase).

Ibarrondo et al measured IgG levels serially, and reported that the decline corresponds to a half-life of approximately 36 days, in mild infections.

Our study, on the other hand, suggests that the humoral response to SARS-CoV-2 infection is more transient than previously demonstrated, and does not last beyond 7 weeks.

CONCLUSION

These finding may have a significant implication on the protection that vaccines are able to provide considering that a natural infection has such a transient antibody response. However, given that the rate of re-infections is significantly low, and that the second infection is usually milder clinically, T-cell (T-lymphocyte) mediated cellular immunity may play a bigger role in protecting against COVID-19. Prospective studies looking at quantitative measurements of antibodies to SARS-CoV-2 and evaluating cellular immunity in infected individuals may help us understand the immunological response to this virus better.

REFERENCES


Cite this article as: Kumar N, Bhartiya S, Singh T. Antibodies to SARS-CoV2 detectable for less than 50 days in polymerase chain reaction confirmed COVID-19 patients. Int J Community Med Public Health 2020;7:3378-9.