

## 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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## 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.<sup>1-4</sup>

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.**

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

## 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.<sup>1-4</sup> 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).<sup>2</sup>

Ibarrondo et al measured IgG levels serially, and reported that the decline corresponds to a half-life of approximately 36 days, in mild infections.<sup>3</sup>

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.

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