

## Short Reports

### Seroprevalence of Covid-19 infection among healthcare workers: A study from a tertiary care hospital in the National Capital Region of India

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#### ABSTRACT

**Background.** Seroprevalence studies on severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection can provide information on the target populations for vaccination. We aimed to evaluate the seroprevalence among healthcare workers (HCWs) at our tertiary care institution and to identify parameters that may affect it.

**Method.** We assessed seroprevalence of SARS-CoV-2 by the chemiluminescence immunoassay test among 3258 HCW in our hospital and evaluated as per gender, age, their previous Covid-19 diagnosis, role in hospital and type/risk of exposure.

**Results.** Of 3258 participants, 46.2% (95% CI 44.4%–47.9%) were positive for SARS-CoV-2 IgG antibodies (i.e. IgG  $\geq$  15 AU/ml). Higher seroprevalence was seen in non-clinical HCWs (50.2%) than in clinical HCWs (41.4%,  $p=0.0001$ ). Furthermore, people with a history of Covid-19 were found to have significantly higher antibody levels ( $p=0.0001$ ). Among the HCWs, doctors and nurses had lower relative risk (RR) of acquiring Covid-19 infection (RR=0.82; 95% CI 0.76–0.89) compared to non-clinical HCWs.

**Conclusion.** Seroprevalence in HCWs at our hospital was

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46.2%. Clinical HCWs had lower seroprevalence compared to non-clinical HCWs. Previous history of Covid-19 almost doubled the seropositivity, particularly in those with current infection.

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#### INTRODUCTION

Several studies have found that seroprevalence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has remained below 20% even in the most adversely affected areas globally, such as Spain and Italy.<sup>1–3</sup> Data from India show variable seroprevalence among healthcare workers (HCWs), ranging from 2.5% from two different hospitals in Srinagar<sup>4</sup> to 11.94% in a tertiary care centre in Kolkata<sup>5</sup> in September 2020.

The variation in rates of seroprevalence being reported from the world and from India, limited availability of the vaccine, and vaccine hesitancy, prompted us to evaluate the seroprevalence in HCWs at our hospital before the national vaccine drive through a prospective, observational study.

#### METHOD

The study was approved by the institutional ethics committee. Data were collected between 12 January and 13 February 2021.

All healthcare personnel of Medanta Hospital who consented to participate were eligible for inclusion. Those who had participated in Covid-19 drug trials, or had received immunoglobulins and/or convalescent plasma within the past 3 months were excluded. Three ml of blood was collected and the serum was stored at 2–8 °C until further testing within a week.

The serum was tested for the quantitative determination of anti-S1 and anti-S2 specific IgG antibodies to SARS-CoV-2 in the fully automated LIAISON® SARS-CoV-2 S1/S2 IgG by chemiluminescence immunoassay technology. The antibody concentrations were expressed as arbitrary units (AU/ml).

The assay detection ranged from 3.8 to 400 AU/ml. SARS-CoV-2 S1/S2 IgG <15 AU/ml was reported negative. Test results  $\geq$ 15.0 AU/ml were graded positive.

#### Data analysis

Seroprevalence was stratified according to the participants' role in the hospital, nature of exposure, demographic data (age and gender), and history of Covid-19 disease with severity of disease and duration. Percentage at risk was calculated as a complement of seroprevalence. Thereafter, relative risk with respect to the reference category (highest protection) was calculated for participants' role in the hospital, nature of exposure, demography (age and gender) and history of Covid-19 disease with duration. The results are presented with 95% confidence intervals and p values. The Mann–Whitney test was used to compare the IgG level between participants with and without a history of Covid-19 infection. All analyses were done using SPSS software, version 24.0. A value of  $p<0.05$  was considered statistically significant.

#### RESULTS

Of the 6550 HCWs eligible for vaccination, 3258 (49.7%) agreed to participate. These included 1490 of 3304 (45.1%) clinical

TABLE I. Covid-19 seroprevalence (IgG  $\geq$ 15.0 AU/ml) by baseline characteristics

Parameter	Number positive/number tested	Covid-19 seroprevalence % (95% CI)	Relative risk (95% CI)	p value
<i>Role in the hospital</i>				
Non-clinical HCW	887/1768	50.2 (47.8–52.5)	–	0.0001*
Clinical HCW	617/1490	41.4 (38.9–44.0)	0.82 (0.76–0.89)	
<i>Nature of exposure</i>				
Low risk	1198/2568	46.7 (44.7–48.6)	–	0.262
High risk	306/690	44.3 (40.6–48.1)	1.05 (0.96–1.15)	
<i>Gender</i>				
Men	866/1838	47.1 (44.8–49.4)	–	0.212
Women	638/1420	44.9 (42.3–47.6)	1.05 (0.97–1.13)	
<i>History of Covid-19 disease</i>				
Yes	384/473	81.2 (77.4–84.6)	–	0.0001*
No	1120/2785	40.2 (38.4–42.1)	2.02 (1.9–2.15)	
<i>History of Covid-19 disease (duration) n=473 (months)</i>				
$\leq$ 3	148/162	91.3 (85.9–95.2)	–	0.0001*
$>$ 3	236/311	75.9 (70.7–80.5)	1.2 (1.11–1.3)	

\*p<0.05 CI confidence interval HCW healthcare worker

HCWs (doctors and nurses) and 1768 of 3758 (47.0%) non-clinical HCWs. The participation rate was similar among men (1838/3739 [49.2%]) and women (1420/3223 [44.1%]). Most of the participants (3209/3258 [98.5%]) were below 60 years of age.

Of the 3258 participants tested for IgG serology (S1 and S2 proteins), 1504 (46.2%; 95%CI 44.4%–47.9%) were seropositive (Table I). Seroprevalence was significantly lower in clinical HCWs (41.4%) than in non-clinical HCWs (50.2%; p=0.0001). Participants with a history of Covid-19 had significantly higher seroprevalence than those without such history (81.2% v. 40.2%; p=0.0001); this difference was particularly marked for those who had had Covid-19 more recently, i.e. in the past 3 months.

## DISCUSSION

Seroprevalence is an important parameter to identify prevention measures for healthcare personnel.<sup>6</sup> Several studies have found that the SARS-CoV-2 seroprevalence has remained below 20% even in the most adversely affected areas globally, such as Spain and Italy.<sup>1–3</sup> Studies in HCWs showed variable seroprevalence of 14.5% (Scotland),<sup>7</sup> 1.2% (Japan)<sup>8</sup> and 3.66% in Rome.<sup>9</sup>

Indian data from Srinagar and Kolkata show prevalence in HCWs ranging from 0.6% to 11.94%<sup>4,5</sup> in September 2020. The seroprevalence in our study was 46.2%, which is much higher compared to the Srinagar and Kolkata studies. This could be due to the nature of our hospital, which treated over 6000 Covid-19 patients till the early part of 2021. Further, this could be an indicator that the seroprevalence has increased over time as our study relates to the period January–February 2021.

Importantly, seroprevalence was significantly lower in clinical (41.4%) versus non-clinical HCWs (50.2%). This may be due to awareness, vigilance and proper use of PPE and other preventive methods in this group of HCWs.<sup>10</sup> Thus, non-clinical HCWs should be more careful in taking proper precautions against exposure to Covid-19. Participants with a history of Covid-19 were found to have significantly higher seroprevalence compared to those without (81.2% v. 40.2%). This indicates that such individuals may need only one dose of vaccination for complete protection.

Our study suggests that the seroprevalence is high in our HCWs; however, it may take time to achieve herd immunity.

## Conclusions

Seroprevalence among HCWs at our hospital was 46.2%. Clinical HCWs had lower seroprevalence compared to non-clinical HCWs. Furthermore, previous history of Covid-19 almost doubled the seropositivity, particularly among those with current infection.

*Conflicts of interest.* None declared

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