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# Study of COVID-19 Seroprevalence Among Healthcare Workers at Dedicated COVID Hospital in Southern Rajasthan

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## ABSTRACT

**Background:** Coronavirus disease 2019 (COVID-19), a pandemic, has affected approximately 90,000 healthcare workers (HCWs) worldwide and 548 HCWs in India with an infection rate of 6%. Seroprevalence studies can provide relevant information which is useful for assessing the level of exposure among hospital personnel, to avoid unnecessary quarantines and for healthcare resource planning. **Aims and objectives:** Study of COVID-19 seroprevalence, clinical profile and outcomes among HCWs working at a dedicated COVID hospital in southern Rajasthan. **Material and methods:** It was a cross-sectional study conducted among 100 HCWs posted in various wards of dedicated COVID hospital at the RNT Medical College, Udaipur, Rajasthan, India, over a period of 2 months from April 2020 to May 2020. **Results:** Out of 100 HCWs, 68% were male and 32% were female with mean age 31.90 years and 16% had seropositive response. Majority, i.e., 81% seropositive HCWs were asymptomatic and all had good outcome (discharged). **Conclusion:** It is advisable that this high-risk population of HCWs should follow infection prevention and control (IPC) protocol as well as institutional quarantine protocol, screening and training at timely interval to protect themselves.

**Keywords:** Seroprevalence, COVID-19, healthcare workers

Coronavirus disease 2019 (COVID-19) is a global health issue today. It started in Wuhan, Hubei Province, China in December 2019 and continued to spread worldwide.[1] COVID-19 is caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), which belongs to the family of positive-sense, enveloped, single-stranded RNA viruses with a size varying from 26 kb to 32 kb.[2] The name 'corona' was derived from the Latin word *coronae* or *crown* which means a colored circle around a luminous body such as sun or moon. The World Health Organization (WHO) declared it as pandemic on 11th March, 2020.[3] In India, the first case was reported on 30th January, 2020 in Kerala. SARS-CoV-2 is mainly transmitted through respiratory droplets and direct contact with contaminated surfaces with incubation period of 2-14 days and basic reproduction number of 2.2.[4]

A healthcare worker (HCW) delivers care and services to the sick either directly as doctors, nurses or indirectly in the form of helpers, laboratory technicians or medical waste handlers. There are over 59 million HCWs globally.[5]

Now, in the midst of COVID-19 pandemic, the *Bhagavad Gita* looks to be more relevant than ever. Here, HCWs look like *Arjuna*, hospitals are like battlegrounds for the war not only against the virus but also against the vast array of misinformation spread by mass media. Amid the chaos that the pandemic has caused, HCWs are being guided by *dharma* and a deep sense of purpose and are urged to do what is right and not to become affected by the outcome.[6]

HCWs are at the front line of the COVID-19 outbreak response and as such are exposed to hazards that put them at risk of infections. Protecting HCWs is of paramount importance and if infected, pose a great risk to vulnerable patients and fellow HCWs.

At least 90,000 HCWs worldwide are believed to have been infected with COVID-19 with average HCW infection

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rate at about 6%. This estimate is based on information collected from 30 different countries by national nursing associations, government figures and media reports.[7] Figures from China's National Health Commission showed that more than 3,300 HCWs had been infected as of early March and, according to local media, at least 22 had died. In Italy, 20% of HCWs were infected and some of them died.[8] Exact incidences of COVID-19 disease among HCWs in India is not yet officially reported but probably it has affected around 548 doctors, nurse and paramedics across the country so far.[9]

Amidst this pandemic scenario, there are a lot of expectations from HCWs and HCWs too have expectations from their higher authorities. It is the basic right of HCWs to be provided with all basic needs which can prevent infectivity, morbidity and mortality among them in the line of duty. These include:

- To provide adequate supplies of personal protective equipment (PPE) such as masks, gloves, goggles, gowns, face shields, etc.
- Refreshers training on infection prevention and control (IPC).
- Maintain appropriate working hours with breaks and followed by quarantine.

Seroprevalence studies can provide relevant information on the proportion of people who have experienced a recent or past infection. Monitoring the prevalence of infection among HCWs is useful for assessing the level of exposure among hospital personnel and identifying high-risk departments. Likewise, knowledge of past infection among HCWs could be useful for avoiding unnecessary quarantines and for healthcare resource planning.

To date, data on seroprevalence of SARS-CoV-2 antibody in HCWs is limited from India as well as from across the globe. Hence, it is our small effort, where we have tried to evaluate seroprevalence of SARS-CoV-2 antibody in HCWs working at a dedicated COVID hospital, a tertiary care hospital situated in southern Rajasthan.

## AIMS AND OBJECTIVES

### Aims

- Study of COVID-19 seroprevalence among HCWs at dedicated COVID hospital in southern Rajasthan.

### Objectives

- To study seroprevalence among HCWs.
- To study clinical profile of seropositive HCWs.

## MATERIAL AND METHODS

### Study Designs and Data Collection

It was a cross-sectional study conducted among 100 HCWs posted in various wards of dedicated COVID hospital at the RNT Medical College, Udaipur, Rajasthan, India, using a descriptive model over a period of 2 months from April 2020 to May 2020.

#### Inclusion criteria

- All symptomatic and asymptomatic HCWs above age of 18 years.

#### Exclusion criteria

- HCWs already on chronic steroid, immuno-suppressant and chemotherapy.
- HCWs who were known case of people living with HIV/AIDS (PLHA) and other immune deficient diseases.
- HCWs not giving consent for study.

All participants enrolled in the present study were from RNT Medical College, Udaipur, Rajasthan and were working in dedicated COVID hospital according to their duty roster. They belonged to different departments such as Internal Medicine, Pulmonary Medicine, Otorhinolaryngology, Anesthesia, Pediatrics and Obstetrics & Gynecology. The nurses and lab technicians who were directly involved in care of COVID-19 patients were also enrolled in the present study. All these subjects were interviewed regarding their basic information, such as age, gender, professional information (occupation, hospital department, shift timing, duty hours) and significant past history, personal history, drug history, reverse transcription polymerase chain reaction [RT-PCR] testing status) were recorded.

All seropositive HCWs were grouped into 3 categories on the basis of clinical features:

- Asymptomatic having no clinical features
- Mild-to-moderate having clinical features such as cough, myalgia, fever <38°C, etc.
- Severe group with acute respiratory distress syndrome (ARDS), myocarditis, acute kidney injury, multi-organ failure, etc.

Follow-up for all seropositive HCWs was done and outcome was observed in the form of discharged and death.

### Antibody-based Card Testing

**Principle –** Immune chromatographic assay

**Test kit –** Provided by SIDAK Lifecare Pvt. Ltd.

**Procedure**

- Place test kit on flat surface.
- Load 2 drops of blood into the sample well; then add 1-2 drop of buffer.
- Interpret the result at 15-20 minutes.

**Interpretation of results –** as shown in Figure 1.

- **Negative result –** If only C band is visible. The absence of any pink line in zones 1 and 2 indicate that no antibodies are present.
- **Positive result –**
  - Along with C band, a band at zone 1 indicates presence of IgM antibodies
  - Along with C band, a band at zone 2 indicates presence of IgG antibodies
  - Along with C band, a band at both zone 1 and 2 indicates presence of both IgM and IgG antibodies.
- **Invalid –** If C band does not appear, the assay is invalid.

## Data Analysis

The collected data were entered in a Microsoft Excel Sheet. Graphs and tables were generated using Microsoft Word and Microsoft Excel. All interval data and proportions have been expressed as percentages.

## RESULTS AND OBSERVATIONS

Out of 100 HCWs, 68% were male and 32% were female with mean age of 31.90 years. Eighty-three (83%) were in the age group of 20-40 years, while 17 (17%) were in the age group of above 40 years. In the present study, HCWs were included from various departments, including 35% from Internal Medicine, 13% from Anesthesia, 9% from Pediatrics, 7% from Otorhinolaryngology, 4% from Obstetrics and Gynecology, 3% from Surgery and 2% from Pulmonary Medicine department; 19% were Nurses and 8% were Lab Technicians (Table 1).

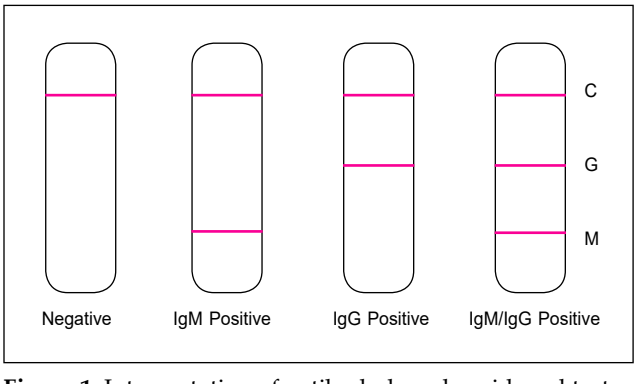



**Figure 1.** Interpretation of antibody-based rapid card test.

Table 2 shows the seroprevalence among HCWs. Out of 100 HCWs, only 16% developed seropositive response while rest of 84% were seronegative. In seropositive HCWs, 8% developed IgM antibody, 8% developed IgM and IgG both, while none of them had IgG antibody positivity.

Table 3 shows the clinical profile of seropositive HCWs. Majority of them, i.e., 13 (81%) remained asymptomatic,

**Table 1.** Epidemiological Profile of HCWs

| Category | HCWs (No.) | Percentage (%) |
|---|---|---|
| **Age** | | |
| 20-40 years | 83 | 83 |
| Above 40 years | 17 | 17 |
| **Sex** | | |
| Male | 68 | 68 |
| Female | 32 | 32 |
| **Departments** | | |
| Internal Medicine | 35 | 35 |
| Nurses | 19 | 19 |
| Anesthesia | 13 | 13 |
| Pediatrics | 9 | 9 |
| Lab Technicians | 8 | 8 |
| Otorhinolaryngology | 7 | 7 |
| Obstetrics and Gynecology | 4 | 4 |
| Surgery | 3 | 3 |
| Pulmonary Medicine | 2 | 2 |

**Table 2.** Seroprevalence Among HCWs

| Category | Number | Percentage (%) |
|---|---|---|
| **Total HCWs** | **100** | |
| Seronegative | 84 | 84 |
| Seropositive | 16 | 16 |
| IgM positive | 8 | 8 |
| IgG positive | 0 | 0 |
| Both IgM and IgG positive | 8 | 8 |

**Table 3.** Clinical Profile and Outcome Among Seropositive HCWs

| Clinical profile of seropositive HCWs | Total seropositive HCWs (n = 16) | % of HCWs | Outcome |
|---|---|---|---|
| Asymptomatic | 13 | 81 | Discharged |
| Mild-to-moderate | 3 | 19 | Discharged |
| Severe | 0 | 0 | |

3 (19%) developed mild-to-moderate clinical features such as cough, sore throat and fever, whereas no one had severe degree of illness.

## DISCUSSION

HCWs are at the highest risk for acquiring infections during novel COVID-19 outbreaks. Thus, if transmission rises, the number of front line HCWs could become insufficient to respond to the healthcare demand. To cope with this scenario, several strategies, including periodic screenings, weekly shifts, limiting work duration per day, training program which includes proper use of PPEs and way of sanitization by which we can protect ourselves, have been suggested.

At present, to the best of our knowledge, no such a type of study is yet available from India that suggests seroprevalence rate, clinical presentation and outcome in COVID-19 disease in HCWs. Hence, we have planned to see seropositivity among front line HCWs who are working in a dedicated COVID hospital, which may be helpful in resources planning.

In the present study, 100 HCWs were included out of which 68% were male and 32% were female. They were grouped according to age and it was found that 83% were from younger age group between 20 and 40 years of age, whereas rest 17% were above the age of 40 years.

In the present study, HCWs were selected from various departments depending on the duty roster of COVID hospital - 35% were from Internal Medicine, 19% were Nurses, 13% were from Anesthesia, 9% were from Pediatrics, 8% were Lab Technician, 7% were from Otorhinolaryngology, 4% were from Obstetrics and Gynecology, 3% were from surgery and rest 2% were from Pulmonary Medicine. In a study conducted by Fujita et al,[10] a total of 92 HCWs were recruited. Of these, medical doctors, nurses and medical clerks constituted 45.7%, 52.2% and 2.2% of the participants, respectively. Fifty-nine of these (64.1%) were women with the majority of participants in their twenties and thirties. The common place of work was otolaryngology department, followed by respiratory and emergency medicine departments. The study done by Fujita et al matches with the present study in respect to age distribution but does not match regarding sex and department distribution, due the fact that the maximum subjects were selected according to duty roster of COVID hospital.

The present study was carried out among 100 HCWs out of which 16% developed seropositive response, while rest of 84% were seronegative. Among seropositive ones, 8% developed IgM antibody, 8% developed IgM/IgG both, while none of them had only IgG antibody positivity. A similar study conducted by Garcia-Basteiro et al,[11] was conducted among 578 HCWs in a large Spanish reference hospital. Investigators found that the cumulative prevalence of SARS-CoV-2 infection was 11.2% and further among those with seropositivity, they observed 6.2%, 7.6%, 9.3% had IgM, IgG and both IgG/IgM/IgA antibody response, respectively.

In the present study, seroprevalence found was lower than expected, which could be explained by sufficient availability of PPE, proper donning and doffing by HCWs because of effective training before duties, early implementation of RT-PCR screening programs in HCWs working in COVID-19 units, coupled with timely case identification and effective contact tracing and quarantines for those outside COVID-19 unit.

On analyzing clinical profile of seropositive HCWs, it was observed that majority of them, i.e., 13 (81%) were remained asymptomatic, 3 (19%) developed mild-to-moderate clinical features such as cough, sore throat and fever, whereas none of them had severe degree of illness like atypical pneumonia, ARDS, myocarditis, acute kidney injury and multiple organ dysfunction syndrome and none of them required ventilator support and ICU care while the study done by Garcia-Basteiro et al found 80% of seropositive HCWs were symptomatic with mild-to-moderate symptoms. In the present study, most of the seropositive HCWs were asymptomatic and they didn't develop complications which could be explained by low viral load, younger age groups, no associated comorbidity, good immune status, proper use of PPEs, less contact time with COVID patients, and high standard of infection control strategy at our institute.

The present study is too small to conclude the clear picture about COVID-19 infection in HCWs, but it was found that infection rate was 16% among HCWs and majority of them were asymptomatic, which may spread infection across other population groups; hence,

it is advisable that all these HCWs should undergo RT-PCR screening programs/antibody-based rapid card testing as per protocol, which may pick up disease earlier and stop spreading further.

We further say that institutional quarantine, an essential evil, still remains a dilemma as we need to balance between safety of HCWs and their family versus our limited resources.

## CONCLUSION

From the present study which was carried out over 100 HCWs, we conclude that COVID-19 disease is common in HCWs with 16% found seropositive. Majority of them remained asymptomatic, i.e., 81%, whereas remaining 19% had mild-to-moderate degree of disease. No HCWs had severe illness or required ventilator support and ICU care. This may be due to proper use of PPEs and other IPC measures. It is advisable that this high-risk population of HCWs should follow IPC protocol as well as institutional quarantine protocol, screening and training at timely interval to reduce further seroprevalence rate among them.

## REFERENCES

1. Zhu N, Zhang D, Wang W, Li X, Yang B song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med. 2020;382(8):727-33.
2. Weiss SR, Navas-Martin S. Coronavirus pathogenesis and the emerging pathogen severe acute respiratory syndrome coronavirus. Microbiol Mol Biol Rev. 2005;69(4):635-64.
3. World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19 – 11 March 2020. Available at: https://www.who.int/dg/speeches/detail/whodirector-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020. Accessed March 17, 2020.
4. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. N Engl J Med. 2020;382(13):1199-207.
5. Joseph B, Joseph M. The health of the healthcare workers. Indian J Occup Environ Med. 2016;20(2):71-2.
6. Kalra A, Michos ED, Chinnaiyan KM. COVID-19 and the healthcare workers. European Heart J. 2020;00:1-2.
7. 90,000 healthcare workers infected with COVID-19: ICN. www.aa.com.tr. Retrieved 13 May 2020.
8. The Lancet. COVID-19: protecting health-care workers. Lancet. 2020;395(10228):922.
9. 548 doctors, nurses, paramedics infected with Covid-19 across India: Report. Accessed from: https://www.hindustantimes.com/india-news/548-docs-nurses-paramedics-infected-with-covid-19-across-india-report/story-o2pM3w2adM4g3PXI6TBlkN.html
10. Fujita K, Kada S, Kanai O, Hata H, Odagaki T, Satoh-Asahara N, et al. Quantitative SARS-CoV-2 antibody screening of healthcare workers in the southern part of Kyoto city during the COVID-19 peri-pandemic period. Accessed via medRxiv preprint surver; URL https://www.medrxiv.org/content/10.1101/2020.05.12.20098962v2.article-info.
11. Garcia-Basteiro AL, Moncunill G, Tortajada M, Vidal M, Guinovart C, Jimenez A, et al. Seroprevalence of antibodies against SARS-CoV-2 among health care workers in a large Spanish reference hospital. medRxiv 2020.04.27.20082289; Accessed via medRxiv preprint surver; URL https://www.medrxiv.org/content/10.1101/2020.04.27.20082289v1

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### No Improvement in Remission with Combo Therapy for IBD

Combination therapy with immunomodulators in addition to the newer biologics ustekinumab or vedolizumab was found not to improve the rates of clinical remission or response, endoscopic remission or persistence of therapy at 1 year in patients with Crohn's disease or ulcerative colitis, reported an international study published online in *Clinical Gastroenterology and Hepatology*.

Investigators noted that similar number of patients remained on treatment or exhibited endoscopic response at 12 months with either monotherapy with one of these newer non-anti-TNF (tumor necrosis factor) biologics or combination therapy with a biologic and methotrexate or a thiopurine. For patients receiving vedolizumab, adding a thiopurine or methotrexate led to no difference in clinical remission or response compared to monotherapy at Week 14 (68.2% vs. 74.1%; p = 0.22), Week 30 (74.3% vs. 75.6%; p = 0.78) and Week 54 (78.3% vs. 72.9%; p = 0.33). Additionally, in those receiving ustekinumab, no difference was evident in clinical remission or response with combination therapy at Week 14 (54.6% vs. 65.8%; p = 0.08), Week 30 (71.6% vs. 77.4%; p = 0.33) and Week 54 (62.1% vs. 67.0%; p = 0.52). About 48.9% of patients on combination therapy and 45% on monotherapy had therapy failure during the first-year follow-up… (*Medpage Today*)