COVID-19 prevalence among health-care workers of Gastroenterology department: An audit from a tertiary-care hospital in India

Mahesh Kumar Goenka,* Bhavik Bharat Shah,* Usha Goenka,† Sudipto S Das,‡ Shivaraj Afzalpurkar,* Mohuya Mukherjee,† Vikram U Patil,* Surabhi Jajodia,† Gajanan A. Rodge,* Ujjaini Khan∥ and Syamasis Bandopadhyay∥

*Institute of Gastrosciences and Liver, †Department of Clinical Imaging and Interventional Radiology, ‡Department of Transfusion Medicine and Blood Bank, §Department of Biostatistics, ¶Department of Microbiology and ∥Department of Internal Medicine, Apollo Gleneagles Hospitals, Kolkata, India

Key words
COVID-19, gastroenterology, health-care workers, seroassay.

Accepted for publication 20 October 2020.

Correspondence
Dr Mahesh K Goenka, Institute of Gastrosciences and Liver, Apollo Gleneagles Hospitals Limited, 58, Canal Circular Road, Kolkata 700054, West Bengal, India.
Email: mkgkolkata@gmail.com

Declaration of conflict of interest: None.

Abstract

Background and Aim: In the present coronavirus disease-19 (COVID-19) era, health-care workers (HCWs) warrant special attention because of their higher risk and potential to transmit the disease. Gastroenterology services include emergency and critical care along with the endoscopy procedures, which have aerosol-generating potential. This study was aimed at auditing the COVID-19 impact on HCWs working in the Gastroenterology department of our hospital.

Methods: The COVID-19 status of 117 HCWs was collected using either polymerase chain reaction (PCR) or Immunoglobulin G (IgG) seroassay. COVID-19 positivity was correlated with demographic characteristics, job profile, area of work, and medical history.

Results: Thirty-eight HCWs (32.48%) showed evidence of COVID-19 using PCR (23.93%) or only IgG assay (8.55%). Endoscopy technicians (68.75%) exhibited significantly higher (P = 0.003) COVID-19 incidence compared to doctors (20.69%). Those working in the critical care units exhibited a trend toward higher COVID-19 incidence (42.86%). None of the six HCWs who received adequate hydroxychloroquine prophylaxis developed evidence of COVID-19. All the HCWs with COVID-19 disease recovered. However, there was a considerable loss of “man-days.”

Conclusions: In our setting, we observed a high COVID-19 risk for HCWs working in the Gastroenterology department, with the highest risk among the endoscopy technicians. A more stringent triaging and pretesting of patients, as well as HCWs, might decrease the risk of COVID-19. Further multicenter studies are needed to evaluate the risk and related parameters.

Introduction

India has become the epicenter of the coronavirus disease-2019 (COVID-19) outbreak, making it the second most affected country in the world.¹ Health-care workers (HCWs) constitute a special subgroup of the population, which is at a substantial risk of infection and is an important disease transmission source. Previous studies have reported COVID-19 seroprevalence rates of up to 17.4% among the HCWs.²–⁴ Moreover, an increasing number of reports have demonstrated that HCWs are affected by COVID-19 with significant morbidity and mortality.

Gastroenterology staff members are involved not only in outpatient care but also in emergencies, critical care, and endoscopy practice. Endoscopy procedures are generally considered aerosol-generating, with a potentially higher risk to the staff directly involved in such procedures.⁵ In our previous study, we showed that HCWs working in the Gastroenterology department exhibited the highest seroprevalence rate for COVID-19.⁶ There is, however, scarcity of data on the burden of COVID-19 among HCWs in the Gastroenterology and Endoscopy services.⁷,⁸ We, therefore, conducted a prospective study in the Gastroenterology department of a large tertiary-care hospital in India to study the burden of COVID-19 among HCWs and its correlation with the demographic characteristics of HCWs, their job profiles, and nature of work.

Methods

Study population. This cross-sectional study was performed in August 2020. The department of Gastroenterology at the Apollo Gleneagles Hospitals, Kolkata, India, has 117 HCWs.
These include consultants, residents, technicians, nurses, executives, housekeeping staff, and dieticians. The department has 75 dedicated beds, including 20 in intensive care, 12 outpatient rooms, and six endoscopy suites with round-the-clock emergency services. All the 117 HCWs were requested to participate in the study and provided informed consent. The institutional ethics committee approved the study.

COVID policy of department. The policy of the department in terms of triaging, testing, and use of personal protective equipment (PPE) has been evolving. In the initial 2 months, we were triaging patients, and only those with symptoms suggestive of COVID 19 or a history of contact or travel to high prevalent areas were tested for COVID-19 with an reverse transcription-polymerase chain reaction (RT-PCR). However, in last 2 months, we followed a more stringent policy, insisting on RT-PCR testing for all patients except those undergoing emergency endoscopy. Our policy for admission has been the same as for endoscopy. For the outpatient clinic, however, we interviewed patients throughout this period and referred all suspected patients to hospital triage area. Others were allowed with precautions such as use of masks along with maintenance of social distancing. HCWs in the endoscopy and intensive units wear N-95 masks, surgical gowns, cap, gloves, and shoe cover, while those in the outpatient area and non-COVID ward wear N95 mask and surgical gowns with frequent hand washing.

Almost all endoscopic procedures were performed under propofol sedation. A few (approximately 20%) diagnostic upper gastrointestinal endoscopies, however, were performed with pharyngeal lignocaine application as desired by the patients.

Study design. A questionnaire in the form of a Google form was sent to all the participants either by email or to their registered phone numbers. This form included 26 multiple-choice questions with the options of selecting either one or more responses (Supplementary material). The survey questions were divided into three sections: demographic details; job profile with work details; and relevant medical history, including diagnosis of COVID-19 and its severity based on the Indian council of medical research (ICMR) guidelines. The HCWs were then categorized into two groups:

Category A: Those recently diagnosed with COVID-19 using RT-PCR analysis of nasopharyngeal/oropharyngeal swab. The test was performed either because of suggestive symptoms or close contact with a COVID-19 patient.

Category B: Those with no symptoms or mild nonspecific symptoms and were never tested using RT-PCR or were tested negative.

RT-PCR and COVID antibody testing. A total of 109 HCWs underwent RT-PCR testing. The test was performed in 34 HCWs due to their symptoms, which were suggestive of COVID-19, and in 75 because of close contact with a diagnosed case of COVID. RT-PCR was scheduled in symptomatic HCWs after the onset of symptoms. In HCWs with only contact with positive cases, the test was performed 5–7 days after the last close contact. The test was carried out using nasopharyngeal and oropharyngeal swabs that were collected in viral transport media and sent to the lab under cold chain. Detection was based on real-time PCR using the 5′ nuclease technique targeting the SARS-CoV-2-specific 148 bp N gene and 136 bp RdRp gene using the ARGENE *SARS-COV-2R-Gene* amplification kit by bioMerieux, France.

All 117 HCWs were tested for IgG antibody against COVID-19 using the enhanced chemiluminescence method (Vitros ECi, Ortho Clinical Diagnostics, New Jersey, USA). This assay is based on a recombinant form of the SARS-CoV-2 spike subunit 1 protein. This assay’s results are determined by the sample’s signal-to-cut-off (S/Co) ratio, with values of <1.0 and ≥1.0 corresponding to negative and positive results, respectively. For category B, IgG antibody testing was performed at any time during the study period. For category A, the serological test was conducted at least 3 weeks after the onset of symptoms or diagnosis of COVID-19 disease by RT-PCR.

Statistical analysis. All statistical analyses were performed using SPSS 20.0. Categorical variables were expressed as the number of patients and the percentage of patients and analyzed using Pearson’s Chi-Square Test for Independence of Attributes or Fisher’s Exact Test, as appropriate. We also conducted univariate and multivariate logistic regression analyses to determine associated factors. In all cases, a P-value of less than 0.05 was considered statistically significant.

Results

A total of 117 HCWs working in the gastroenterology department were included in the study, of which 62 (53%) were males. The age range of the participants was 20–61 years. Fifty-seven (48.71%) HCWs belonged to ≤30 years age group. The demographic details and seropositivity of the HCWs involved in the study are given in Table 1. Twenty-eight (23.93%) participants were tested and found to be COVID-19 positive using PCR. These included 19 who were symptomatic for COVID-19 and 9 who had history of contact with COVID-positive individuals but were asymptomatic. All these 28 RT-PCR-positive HCWs also tested positive for IgG antibody after 3 weeks of onset of disease. In addition, 10 (8.55%) HCWs tested positive for the COVID-19 IgG antibody but were never suspected of or diagnosed with COVID-19 using RT-PCR. Thus, the overall COVID-19 burden in our department was 32.48%. Figure 1 depicts the distribution of HCWs based on COVID-19 positivity.

Our cohort included 29 doctors, 43 nurses, 16 endoscopy technicians, 13 executives, 10 housekeeping staff, and 6 dieticians. Figure 2 shows the total number of participants along with the COVID-19 positivity rates in each of these categories. The highest prevalence for COVID-19 (RT-PCR or IgG positive) was observed for the endoscopy technicians (68.75%, P = 0.003), followed by executives (38.46%), nurses (34.88%), doctors (20.69%), and housekeeping staff (10%). None of the six dieticians were either PCR-positive or IgG-positive.

Figure 3 shows the COVID-19 positivity rate based on the area of work. The HCWs working in the critical care unit exhibited the highest COVID-19 positivity rate of 42.86% (15/35), followed by those who worked in the gastroenterology ward (29.17%, 7/24), endoscopy unit (28.26%, 13/46), and outpatient care (25%, 3/12). The difference was, however, was not statistically significant. Of the 28 HCWs who tested positive...
through RT-PCR, 9 (32.14%) were asymptomatic, 15 (53.57%) had mild disease, 3 (10.71%) had moderate disease, and 1 (3.57%) had severe disease. All COVID-19 PCR-positive participants required quarantine either at their home or in the hospital's quarantine facility; however, only one required hospitalization and oxygenation. None of the HCWs required antiviral medications, high-flow nasal oxygen, or mechanical ventilation. None of the participants died due to COVID-19. The quarantine/leave period for HCWs varied from 7 to 40 days. This amounted to a "man-day lost" of 524 days. We also interviewed all HCWs with positive PCR or IgG for their family history and noted that eight HCWs had family members also diagnosed with COVID. In only one case, a family member was affected before the HCW, and the remaining seven had family members diagnosed almost simultaneously or a few days later.

All of these 28 HCWs who were tested and found to be COVID-19-positive through PCR subsequently tested positive for IgG based on an S/Co ratio varying between 1.13 and 29.20.

| Sl no | Parameter                  | Group               | Total number | Either PCR- or IgG-Positive HCW |
|-------|----------------------------|---------------------|--------------|--------------------------------|
| 1     | Gender                     | Female              | 55           | Number | %    | P value |
| 2     | Age                        | ≤30 years           | 57           | 21     | 36.84 | 0.532   |
|       |                            | 31–40 years         | 35           | 10     | 28.57 |          |
|       |                            | 41–50 years         | 19           | 5      | 26.32 |          |
|       |                            | >50 years           | 6            | 2      | 33.33 |          |
| 3     | Diet                       | Nonvegetarian       | 109          | 35     | 32.11 | 0.473   |
|       |                            | Vegetarian          | 8            | 3      | 37.50 |          |
| 4     | Job profile                | Dietician           | 6            | 0      | 0.00  | <0.0001 |
|       |                            | Executives          | 13           | 5      | 38.46 |          |
|       |                            | Housekeeping staff  | 10           | 1      | 10.00 |          |
|       |                            | Nurse               | 43           | 15     | 34.88 |          |
|       |                            | Technician          | 16           | 11     | 68.75 |          |
|       |                            | Doctor              | 29           | 6      | 20.69 |          |
| 5     | Working department         | Endoscopy           | 46           | 13     | 28.26 | 0.086   |
|       |                            | Gastro critical care| 35           | 15     | 42.86 |          |
|       |                            | Gastro OPD          | 12           | 3      | 25.00 |          |
|       |                            | Gastro Wards        | 24           | 7      | 39.17 |          |
| 6     | Time spent in hospital in a week | Up to 48 h | 69    | 19    | 27.54 | 0.146   |
|       |                            | >48 h               | 48           | 19     | 39.58 |          |
| 7     | Blood group                | A                   | 20           | 6      | 30.00 | 0.705   |
|       |                            | Others              | 97           | 32     | 32.99 |          |
| 8     | Mode of transport          | By walk             | 3            | 1      | 33.33 | 0.204   |
|       |                            | Personal vehicle    | 42           | 10     | 23.81 |          |
|       |                            | Public transport    | 72           | 27     | 37.50 |          |
| 9     | Number of persons in room  | 1–2                 | 60           | 19     | 31.67 | 0.99    |
|       |                            | 3–5                 | 48           | 16     | 33.33 |          |
|       |                            | More than 5         | 9            | 3      | 33.33 |          |
| 10    | BCG vaccination            | No                  | 29           | 10     | 34.48 | 0.714   |
|       |                            | Yes                 | 88           | 28     | 31.62 |          |
| 11    | MMR vaccination            | No                  | 65           | 18     | 27.69 | 0.179   |
|       |                            | Yes                 | 52           | 20     | 38.46 |          |
| 12    | Comorbidity                | With comorbidities  | 16           | 6      | 37.50 | 0.473   |
|       |                            | Without comorbidities| 101         | 32     | 31.68 |          |
| 13    | Intake of immune boosters  | No                  | 82           | 29     | 35.37 | 0.249   |
|       |                            | Yes                 | 35           | 9      | 25.71 |          |
| 14    | HCQ prophylaxis            | Adequate dose       | 6            | 0      | 0.00  | —       |
|       |                            | Inadequate dose or none| 111      | 38     | 34.23 |          |
| 15    | Area of your residence     | Metropolitan        | 50           | 11     | 22.00 | 0.022   |
|       |                            | Outside             | 67           | 27     | 40.30 |          |
| 16    | Containment zone           | Maybe               | 27           | 8      | 29.63 | 0.751   |
|       |                            | No                  | 59           | 19     | 32.20 |          |
|       |                            | Yes                 | 31           | 11     | 35.48 |          |

BCG, bacille Calmette-Guerin; HCQ, hydroxychloroquine; HCW, health-care worker; MMR, measles, mumps, rubella; OPD, out patient department; PCR, polymerase chain reaction.
with a median of 8.46 and mean (± SD) of 10.57 (± 7.02). Of the 10 HCWs who only tested positive for IgG, the S/Co ratio ranged between 2.48 and 9.1, with a median of 8.46 and mean (± SD) of 6.21 (±2.41). Thus, there was a higher IgG S/Co ratio among PCR-positive HCWs compared to only IgG-positive HCWs. This difference, however, as shown in Figure 4, was not statistically significant ($P = 0.056$).

**Univariate and multivariate analysis.** Univariate analysis showed that the age group, working department, time spent in hospital, blood group, mode of transport, number of persons in a room, bacilli Calmette-Guerin (BCG) vaccination, measles, mumps and rubella (MMR) vaccination, comorbidity, intake of immune boosters, and residence in the containment zone for IgG- or PCR-positive group were not significantly different compared to that of the negative group. However, the job of endoscopy technician and the area of residence outside the metropolitan area were associated with significantly higher COVID-19 positivity (Table 2). On multivariate analysis, none of these parameters reached statistical significance (Table 3).

**Discussion**

This study was conducted to assess the COVID-19 prevalence among the HCWs working in the Gastroenterology department. Our results showed an overall COVID-19 prevalence of 32.48% in our study sample. In an earlier study of ours, which was aimed to assess the seroprevalence of COVID-19 in various clinical departments, we found a high prevalence of COVID-19 among HCWs working in the Gastroenterology department. This could possibly be attributed to the regular performance of gastrointestinal endoscopies, which are considered to be aerosol-generating
procedures. Gastroenterology and endoscopy practice in our country has gone through three phases in the current pandemic. In the first 2 months of nationwide lockdown, that is, mid-March to mid-May 2020, there was a significant decrease (by almost 10% compared to that in the pre-COVID-19 era) in the frequency of endoscopy all over the country, as shown by our nationwide survey. During the gradual “unlocking” procedure, that is, later part of May to mid-July, most of the endoscopy services were triaging the patients on the basis of suspicion of COVID-19, with those having relevant symptoms or history of contact with individuals subjected to PCR testing. This could have resulted in asymptomatic individuals evading the diagnosis and being admitted or undergoing endoscopy and, subsequently, infecting HCWs. As mentioned above, in the last 2 months, with increasing availability of COVID-19 testing facilities, most of the centers, including ours, have now made COVID-19 testing mandatory before any endoscopic procedure or admission in the gastroenterology wards. However, till date, emergency endoscopies have been performed without excluding COVID-19 cases, and the safety of HCW in the emergency units depends only on the use of personal protective equipment (PPE) and other safety measures. We ensured that PPE used by each HCW included an N-95 mask, full gown, shoe cover, cap, and gloves.

Several studies have reported 0–17.4% COVID-19 prevalence among HCWs. However, very few have evaluated the impact of COVID-19 on specific medical departments. Repici et al., in a multicenter study from Italy, reported a very low risk of COVID-19 among HCWs in the gastrointestinal endoscopy units. They reported that 42 (4.3%) endoscopy unit HCWs developed COVID-19 during the study period. However, their study was retrospective in nature and was conducted in March 2020, when the COVID-19 pandemic was still in its initial stages. In contrast to our study, the Italian study reported that a higher proportion of physicians (7.1%) was affected by COVID-19 compared to endoscopy unit nurses (3.2%) or health-care assistants (2.0%).

In the present study, of 38 HCWs exhibiting evidence of COVID, the diagnosis of 28 HCWs was confirmed by PCR. The diagnosis of the remaining 10 HCWs was confirmed by only serological analysis, which indicated recent asymptomatic infection. These HCWs, before seroconversion, could be responsible for spreading the disease not only to the patients but also to their fellow departmental staff. This raises a question of periodic surveillance of HCWs in medical departments, such as gastroenterology, using RT-PCR to diagnose active asymptomatic infections.

An interesting observation in the present study was relatively high IgG levels in terms of the signal-to-cutoff ratio among PCR-positive HCWs compared to those with only serological positivity. This difference in the two groups was, however, not statistically significant, which might be attributed to a small sample size. Higher IgG levels among HCWs with PCR positivity might reflect a higher immunological response in patients with clinical manifestation of COVID-19 and department of gastroenterology MK Goenka et al.

| GASTRO CRITICAL CARE | GASTRO WORDS | ENDOSCOPY | OUTPATIENT |
|----------------------|--------------|-----------|------------|
| Total: 35            | 24           | 46        | 12         |
| Positive: 15         | 07           | 13        | 03         |

Figure 3 Bar diagram depicting the percentage of health-care workers with evidence of COVID-19 (polymerase chain reaction or IgG positive) in relation to working area. ( ), Working department.

Figure 4 Box-whisker plot showing COVID IgG S/co ratio among health-care workers as per COVID reverse transcription–polymerase chain reaction (RT-PCR) status. The median (range) IgG signal to cut-off ratio in those who were negative for COVID RT-PCR was 6.79 (2.48–9.10), while it was 8.46 (5.89–12.73) for those positive for COVID RT-PCR. ( ), RT-PCR non reactive; ( ), RT-PCR reactive.
the disease. Fortunately, none of our HCWs exhibited any fatality. An additional observation was the considerable loss of human resources for the department in terms of loss of man-days.

In the present study, endoscopy technicians exhibited high odds ratios compared to doctors in both univariate (odds ratio [OR]: 8.43, \( P = 0.003 \)) and multivariate analyses (OR: 2.27, \( P = 0.609 \)). This finding, if validated in a larger study, could be attributed to their close association with endoscopic procedures, cleaning of endoscopes, and reprocessing of accessories. We also noted a trend toward higher COVID-19 prevalence in HCWs in the critical care area. This finding could again be attributed to a greater interaction with the critical patients admitted and the performance of various life-saving and invasive procedures. However, we observed that HCWs working in our department were often noted to be having their meal and snacks together, obviously sitting closely and without any mask. It is not possible to attribute high COVID-19 risk solely to the professional environment. A transmission in the household cannot be ruled out.

### Table 2: Univariate analysis

| Variable                          | Total | IGG or PCR positive | IGG or PCR positive % | OR     | Lower bound | Upper bound | \( P \) value |
|-----------------------------------|-------|---------------------|-----------------------|--------|-------------|-------------|--------------|
| Age group                         |       |                     |                       |        |             |             |              |
| ≤30 years                         | 57    | 21                  | 36.84                 | 1.17   | 0.19        | 6.92        | 0.865        |
| 31–40 years                       | 35    | 10                  | 28.57                 | 0.80   | 0.13        | 5.08        | 0.813        |
| 41–50 years                       | 19    | 5                   | 26.32                 | 0.71   | 0.01        | 5.18        | 0.739        |
| >50 years                         | 6     | 2                   | 33.33                 |        |             |             |              |
| Job profile                       |       |                     |                       |        |             |             |              |
| Dietician                         | 6     | 0                   | 0.00                  |        | 0           | 0           | 0            |
| Executives                        | 13    | 5                   | 38.46                 | 2.39   | 0.57        | 10.05       | 0.232        |
| Housekeeping                      | 10    | 1                   | 10.00                 | 0.43   | 0.06        | 4.053       | 0.458        |
| Nurse                             | 43    | 15                  | 34.88                 | 2.05   | 0.69        | 6.14        | 0.198        |
| Technicians                       | 16    | 11                  | 68.75                 | 8.43   | 2.10        | 33.77       | 0.003        |
| Doctor                            | 29    | 6                   | 20.69                 |        |             |             |              |
| Working department                |       |                     |                       |        |             |             |              |
| Endoscopy                         | 46    | 13                  | 28.26                 | 0.95   | 0.32        | 2.84        | 0.937        |
| Critical care                     | 35    | 15                  | 42.86                 | 1.82   | 0.60        | 5.50        | 0.288        |
| Gastro OPD                        | 12    | 3                   | 25.00                 | 0.81   | 0.17        | 3.91        | 0.793        |
| Gastro wards                      | 24    | 7                   | 29.17                 |        |             |             |              |
| Working hours/week in hospital    |       |                     |                       |        |             |             |              |
| >48 h                             | 48    | 19                  | 39.58                 | 1.72   | 0.79        | 3.77        | 0.173        |
| Up to 48 h                        | 69    | 19                  | 27.54                 |        |             |             |              |
| Blood group                       |       |                     |                       |        |             |             |              |
| A                                 | 20    | 6                   | 30.00                 | 0.87   | 0.31        | 2.48        | 0.795        |
| Others                            | 97    | 32                  | 32.99                 |        |             |             |              |
| Mode of transport                 |       |                     |                       |        |             |             |              |
| By walk                           | 3     | 1                   | 33.33                 | 0.83   | 0.07        | 9.63        | 0.884        |
| Personal vehicle†                 | 42    | 10                  | 23.81                 | 0.52   | 0.22        | 1.22        | 0.135        |
| Public transport‡                 | 72    | 27                  | 37.50                 |        |             |             |              |
| No of members sharing a common room |       |   |                       |        |             |             |              |
| 1–2                               | 60    | 19                  | 31.67                 | 0.93   | 0.21        | 4.11        | 0.92         |
| 3–5                               | 48    | 16                  | 33.33                 | 1      | 0.22        | 4.53        | 1            |
| More than 5                       | 9     | 3                   | 33.33                 |        |             |             |              |
| BCG vaccination in childhood      |       |                     |                       |        |             |             |              |
| No                                | 29    | 10                  | 34.48                 | 1.13   | 0.46        | 2.74        | 0.791        |
| Yes                               | 88    | 28                  | 31.82                 |        |             |             |              |
| MMR vaccination                   |       |                     |                       |        |             |             |              |
| No                                | 65    | 18                  | 27.69                 | 0.61   | 0.28        | 1.34        | 0.218        |
| Yes                               | 52    | 20                  | 38.46                 |        |             |             |              |
| Comorbidity                       |       |                     |                       |        |             |             |              |
| With comorbidities                | 16    | 6                   | 37.50                 | 1.29   | 0.43        | 3.87        | 0.645        |
| Without comorbidities             | 101   | 32                  | 31.68                 |        |             |             |              |
| Intake of immune boosters         |       |                     |                       |        |             |             |              |
| No                                | 82    | 29                  | 35.37                 | 1.58   | 0.65        | 3.82        | 0.309        |
| Yes                               | 35    | 9                   | 25.71                 |        |             |             |              |
| HCQ prophylaxis                   |       |                     |                       |        |             |             |              |
| Adequate dose                     | 6     | 0                   | 0.00                  | 0      | 0           | 0           |              |
| Inadequate dose or take nothing   | 111   | 38                  | 34.23                 |        |             |             |              |
| Area of residence                 |       |                     |                       |        |             |             |              |
| Metropolitan                      | 50    | 11                  | 22.00                 | 0.41   | 0.18        | 0.96        | 0.039        |
| Outside                           | 67    | 27                  | 40.30                 |        |             |             |              |
| Containment zone                  |       |                     |                       |        |             |             |              |
| Maybe                             | 27    | 8                   | 29.63                 | 0.77   | 0.25        | 2.31        | 0.636        |
| No                                | 59    | 19                  | 32.20                 | 0.86   | 0.34        | 2.16        | 0.754        |
| Yes                               | 31    | 11                  | 35.48                 |        |             |             |              |

BCG, bacille Calmette-Guerin; HCQ, hydroxychloroquine; IgG, immunoglobulin G; MMR, measles, mumps and rubella; OPD, outpatient department; OR, odds ratio; PCR, polymerase chain reaction.

†Employees commuting in their own vehicle.

‡Employees commuting in public transport bus, local train or hospital van.
IgG, immunoglobulin G; OPD, outpatient department; OR, odds ratio; PCR, polymerase chain reaction.

| Variable                  | Total | IgG or PCR Positive | IgG or PCR Positive % | OR | 95% confidence interval |
|---------------------------|-------|---------------------|-----------------------|----|-------------------------|
| Job profile               |       |                     |                       |    |                         |
| Dietician                 | 6     | 0                   | 0                     | 0  | 0                       |
| Executives                | 13    | 5                   | 38.46                 | 0.04 | 0.001–2.26             |
| Housekeeping staff        | 10    | 1                   | 10                    | 0.83 | 0.05–12.61             |
| Nurse                     | 43    | 15                  | 34.88                 | 1.61 | 0.31–16.8             |
| Technician                | 16    | 11                  | 68.75                 | 2.3  | 0.09–52.55             |
| Doctor                    | 29    | 6                   | 20.69                 |     |                         |
| Working department        |       |                     |                       |    |                         |
| Endoscopy                 | 46    | 13                  | 28.26                 | 0.34 | 0.04–2.64             |
| Gastro critical care      | 35    | 15                  | 42.86                 | 1.22 | 0.17–8.69             |
| Gastro OPD                | 12    | 3                   | 25                    | 1.30 | 0.09–19.25             |
| Gastro Wards              | 24    | 7                   | 29.17                 |     |                         |
| Area of residence         |       |                     |                       |    |                         |
| Metropolitan              | 50    | 11                  | 22                    | 0.48 | 0.11–2.15             |
| Outside                   | 67    | 27                  | 40.30                 |     |                         |

IgG, immunoglobulin G; OR, odds ratio; PCR, polymerase chain reaction.

Table 3 Multivariate analysis

Although only one HCW had a prior history of a family member having a confirmed diagnosis of COVID-19. The role of hydroxychloroquine (HCQ) prophylaxis for preventing COVID-19 is still debatable, with previous reports demonstrating both favorable and unfavorable outcomes. 23,24 In the present study, none of the six HCWs who received adequate HCQ prophylaxis suffered from COVID-19. However, no conclusion could be drawn in this respect due to a small sample size. There is no guideline issued by our hospital regarding the use of any prophylactic pharmacological agent.

This study had a few limitations. First, the total number of HCWs was only 117. A broader range of data from larger gastroenterology units or a multicenter study is needed not only to comprehensively assess the overall COVID-19 prevalence but also to quantify the risk according to the job profile, area of work, and other parameters. Second, we did not perform IgM assay, which might have led to missing some of the recent COVID-19-positive cases. However, IgM assay has low sensitivity and specificity, as well as considerable heterogeneity. 2 The IgG assay used in this study targets the S1 spike protein, which is more specific to COVID-19 compared to the nucleocapsid protein-based IgG assay. 25,26 Third, we did not compare the assay has low sensitivity and specificity, as well as considerable heterogeneity. 2 The IgG assay used in this study targets the S1 spike protein, which is more specific to COVID-19 compared to the nucleocapsid protein-based IgG assay. 25,26 Third, we did not compare the assay has low sensitivity and specificity, as well as considerable heterogeneity. 2 The IgG assay used in this study targets the S1 spike protein, which is more specific to COVID-19 compared to the nucleocapsid protein-based IgG assay. 25,26 Third, we did not compare the assay has low sensitivity and specificity, as well as considerable heterogeneity. 2 The IgG assay used in this study targets the S1 spike protein, which is more specific to COVID-19 compared to the nucleocapsid protein-based IgG assay. 25,26 Third, we did not compare the assay has low sensitivity and specificity, as well as considerable heterogeneity. 2 The IgG assay used in this study targets the S1 spike protein, which is more specific to COVID-19 compared to the nucleocapsid protein-based IgG assay. 25,26 Third, we did not compare the assay has low sensitivity and specificity, as well as considerable heterogeneity. 2 The IgG assay used in this study targets the S1 spike protein, which is more specific to COVID-19 compared to the nucleocapsid protein-based IgG assay. 25,26 Third, we did not compare the assay has low sensitivity and specificity, as well as considerable heterogeneity. 2 The IgG assay used in this study targets the S1 spike protein, which is more specific to COVID-19 compared to the nucleocapsid protein-based IgG assay. 25,26 Third, we did not compare the assay has low sensitivity and specificity, as well as considerable heterogeneity. 2 The IgG assay used in this study targets the S1 spike protein, which is more specific to COVID-19 compared to the nucleocapsid protein-based IgG assay. 25,26 Third, we did not compare the

**References**

1. Ministry of health and Family Welfare, Government of India. Available from URL: https://www.mohfw.gov.in/
2. Woon YL, Lee YL, Chong YM et al. Serology surveillance of anti-SARS-CoV-2 antibodies among asymptomatic healthcare workers in Malaysian healthcare facilities designated for COVID-19 care. 2020 (online ahead of print).
3. Garcia-Basteiro AL, Moncunill G, Tortajada M et al. Seroprevalence of antibodies against SARS-CoV-2 among health care workers in a large Spanish reference hospital. Nat. Commun. 2020; 11: 3500.
4. Brant-Zawadzki M, Fridman D, Robinson P et al. SARS-CoV-2 antibody prevalence in health care workers: preliminary report of a single-center study. medRxiv. 2020.
5. Iversen K, Bundgaard H, Hasselbalch RB et al. Risk of COVID-19 in health-care workers in Denmark: an observational cohort study. Lancet Infect. Dis. 2020 (online ahead of print). https://doi.org/10.1016/S1473-3099(20)30589-2.
6. Chen Y, Tong X, Wang J et al. High SARS-CoV-2 antibody prevalence among healthcare workers exposed to COVID-19 patients. J. Infect. 2020; 81: 422–6.
7. Moscota J, Sembajwe G, Jarrett M et al. Prevalence of SARS-CoV-2 antibodies in health care personnel in the New York City area. JAMA. 2020; 324: 893–5.
8. Steensels D, Oris E, Coninx L et al. Hospital-wide SARS-CoV-2 antibody screening in 3056 staff in a tertiary center in Belgium. JAMA. 2020; 324: 195–7.
9. Fujita K, Kada S, Kanai O 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. medRxiv. 2020. https://doi.org/10.1101/2020.05.12.20098962.
10. Ng K, Poon BH, Kiat Puar TH et al. COVID-19 and the risk to health care workers: a case report. Ann. Intern. Med. 2020; 172: 766–7.
11. Pallott SJ, Rayment M, Patel A et al. Point-of-care serological assays for delayed SARS-CoV-2 case identification among health-care workers in the UK: a prospective multicentre cohort study. Lancet Respir. Med. 2020; 89: 884–95.
12. Korth J, Wilde B, Dolf S et al. SARS-CoV-2-specific antibody detection in healthcare workers in Germany with direct contact to COVID-19 patients. J. Clin. Virol. 2020; 128: 104437.

**Acknowledgment**

We thank Mr. Saurav Barman for helping in the compilation of data.
13 Eyre DW, Lumley SF, O’Donnell D et al. Differential occupational risks to healthcare workers from SARS-CoV-2: a prospective observational study. medRxiv. 2020: e60675.
14 Liu M, Cheng SZ, Xu KW et al. Use of personal protective equipment against coronavirus disease 2019 by healthcare professionals in Wuhan, China: cross sectional study. BMJ. 2020; 369: m2195.
15 Johnston ER, Habib-Hein N, Dueker JM et al. Risk of bacterial exposure to the endoscopist’s face during endoscopy. Gastrointest. Endosc. 2019; 89: 818–24.
16 Goenka MK, Afzalpurkar S, Goenka U et al. Seroprevalence of COVID-19 amongst health care workers in a Tertiary Care Hospital of a Metropolitan City from India. J Assoc Physicians India 2020. 2020; 68(11): 38–43.
17 Repici A, Maselli R, Colombo M et al. Coronavirus (COVID-19) outbreak: what the department of endoscopy should know. Gastrointest. Endosc. 2020; 92: 192–97.
18 Repici A, Pace F, Gabbiadini R et al. Endoscopy units and the COVID-19 outbreak: a multi-center experience from Italy. Gastroenterology. 2020; 159(1): 363–66e3.
19 Available from URL: https://www.mohfw.gov.in/pdf/ClinicalManagementProtocolforCOVID19.pdf
20 Goenka MK, Afzalpurkar S, Ghoshal UC, Guda N, Reddy N. Impact of COVID-19 on gastrointestinal endoscopy practice in India: a cross-sectional study. Endosc. Int. Open. 2020; 8: E974–9.
21 Furukawa NW, Brooks JT, Sobel J. Evidence supporting transmission of severe acute respiratory syndrome coronavirus 2 while symptomatic or asymptomatic. Emerg. Infect. Dis. 2020; 26: e201595.
22 Goenka M, Afzalpurkar S, Jajodia S, Shah BB, Tiwary I, Sengupta S. Dual purpose easily assembled aerosol chamber designed for safe endoscopy and intubation during COVID pandemic. VideoGIE. 2020. https://doi.org/10.1016/j.vgie.2020.05.018.
23 Hernandez AV, Roman YM, Pasupuleti V, Barboza JJ, White CM. Hydroxychloroquine or chloroquine for treatment or prophylaxis of COVID-19: a living systematic review. Ann. Intern. Med. 2020; 173: 283–96.
24 Chatterjee P, Anand T, Singh KJ et al. Healthcare workers & SARS-CoV-2 infection in India: a case-control investigation in the time of COVID-19. Indian J. Med. Res. 2020; 151(5): 459–67.
25 Ou X, Liu Y, Lei X et al. Characterization of spike glycoprotein of SARS-CoV-2 on virus entry and its immune cross-reactivity with SARS-CoV. Nat. Commun. 2020; 11: 1–12.
26 Liu W, Liu L, Kou G et al. Evaluation of nucleocapsid and spike protein-based enzyme-linked immunosorbent assays for detecting antibodies against SARS-CoV-2. J. Clin. Microbiol. 2020; 58: e00461–20.