

Original Research Article

Clinico-epidemiological profile of COVID-19 among health care workers from a tertiary care hospital

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ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) is a global health issue. Healthcare workers (HCWs) are especially vulnerable to infection by SARS-CoV-2. The present study was conducted to determine the proportion of HCWs infected with COVID 19 in a tertiary care centre with emphasis on the epidemiological and clinical aspect

Methods: HCWs (symptomatic and asymptomatic contacts) who tested positive for COVID-19 by SARS-CoV-RTPCR or COVID-19 rapid antigen test were included in the study. Demographic and clinical data of the infected HCWs was obtained through a detailed telephonic interview with structured questionnaire.

Results: Out of total 921 HCWs tested for COVID-19 (SARS-CoV-2 RT-PCR and Rapid antigen test), 323 (35%) HCWs were positive. Proportion of COVID-19 positive HCWs among all HCWs was 13.67% (323/2362). Most COVID-19 positive HCWs (88%) were symptomatic. Majority of infected HCWs (62.23%) were between the age group of 21-30 years. Nurses were the most predominantly affected among various categories of HCWs (42.41%). Fever was the most common presenting symptom, seen in 160 (49.50%) HCWs. Comorbidities were found in 28 (8.66%) of infected HCWs. Majority of HCWs (86%) suffered from mild infection.

Conclusions: HCWs, especially nurses, face a high risk of COVID-19 infection while providing care for suspected or confirmed COVID-19 patients. It is important to characterize the epidemiological and clinical profile of HCWs regarding COVID-19 for formulation of prevention and management strategies.

Keywords: COVID-19 infection, SARS-CoV-2, Infection control, Health care worker

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a global health issue today. It was first detected in Wuhan, Hubei Province, China in December 2019 and continued to spread worldwide.¹ It was declared a pandemic by World Health Organization (WHO) on 11th March 2020.² In India, the first case was reported on the 30th January 2020 in Kerala.³

SARS-CoV-2 is mainly transmitted through respiratory droplets and direct contact with contaminated surfaces.⁴

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.⁵ In the first published series of 138 patients from Wuhan, China, 29% of the cases were HCWs.⁶

There are important implications of COVID-19 among HCWs of which the most important is that infected HCWs could also transmit the infections to vulnerable patients if they are not properly and swiftly isolated. High rates of infection among HCWs could cause problems in patient care due to the resultant understaffing in the health system.

The HCWs may also transmit the infection to close family contacts, other HCWs, and the community.^{7,8}

There are very few studies of COVID-19 among HCWs. The data available have focused on proportion of HCWs infected but not sufficiently described epidemiological and clinical characteristics of affected worker.⁹

The present study was conducted to determine the proportion of HCWs infected with COVID-19 in a tertiary care centre with emphasis on the epidemiological and clinical aspect.

METHODS

This was a prospective observational study conducted in an 831 bedded tertiary care hospital in which 350 beds were dedicated to COVID-19 patients. The COVID and non-COVID areas of the hospital were separate. The study was approved by institutional ethics committee. The study was conducted from 14th April 2020 to 31st October 2020. During this period the total number of HCWs working in the hospital was 2362. A total of 8740 COVID-19 patients were treated in the hospital during this period. HCWs presenting to flu OPD with symptoms consistent with COVID-19 were evaluated and tested by SARS-CoV-RTPCR or the rapid antigen test. Those who tested positive with either test was included in the study. Contact tracing of these positive HCWs were done and asymptomatic COVID-19 positive contacts (HCWs) were also included in this study.

The definition of confirmed human infection with SARS-CoV-2 was in accordance with the WHO interim guidance.¹⁰

Demographics and clinical data of the infected HCWs were obtained through a detailed telephonic interview using a structured questionnaire. Following additional information was also recorded: Profession or category of HCW (doctor, nurse, multipurpose worker (MPW) and ancillary staff), work experience, exposure history, symptoms, comorbidities, details of the nature of duty in the COVID designated area, whether they had received training in infection control practices related to COVID-19. Any clusters of infection in the hospital were also traced and analyzed.

Definitions of exposure

Significant exposure was considered an exposure of 15 minutes or more while not wearing PPE and being within 6 feet of person with confirmed COVID-19 and/or having unprotected direct contact with infectious secretions or excretions from a person with confirmed COVID-19. Any duration was considered prolonged if exposure occurred during performance of an aerosol generating procedure.

The infection was considered community acquired if the HCW reported contact with a confirmed COVID-19 case

in the community setting. To find the community source information was collected regarding travel history, social gatherings attended, going out in crowded places for shopping and household contacts. The infection was considered hospital acquired if the HCW reported exposure to a confirmed or suspected COVID-19 case (patient/HCW) in the hospital setting without any contact with a symptomatic or confirmed COVID-19 cases in the community setting or been exposed as per infection prevention and control department records. Those HCWs with no exposure to symptomatic or suspected/confirmed cases in the hospital or in the community setting were recorded as having an unknown or unidentified source.¹¹

Statistical analysis

Data was entered in excel sheet and analyzed using SPSS version 25. Categorical variables have been expressed as frequencies and percentages.

RESULTS

A total of 921 HCWs were tested for COVID-19 (SARS-CoV- RTPCR or rapid antigen test as they showed symptoms or were contacts of positive patients/ HCWs. Out of these, 323 HCWs were positive, thus showing a positivity rate of 35%. Of the total number of HCWs in the health facility considered, the percentage of infected HCWs was 13.67% (323/2362).

Clinico-epidemiological profile of 323 HCWs who were COVID-19 positive were studied (Table 1).

The clinico-epidemiological profile of the 323 HCWs who tested positive for COVID-19 were studied (Table 1).

Of the HCWs who tested positive, 284 (88%) were symptomatic and 39 (12%) were asymptomatic. Majority of the positive cases were females 178 (55.11%) while 145 (44.89%) were males. The age group most affected was 21 to 30 with 201 (62.23 %) cases.

206 (63.78%) HCWs had less than 5 years' experience while 117 (36.22%) had >5 years' experience. As far as category of HCW involved was studied, it was found that nurses were most affected. Infection was seen in 137 (42.41%) nurses, followed by 97 (30.03%) doctors, 58 (17.96%) ancillary staff which included clerks, laboratory technicians, staff from store and ambulance drivers and 31 (9.60%) multipurpose workers (Table 1).

193 (59.75%) HCWs gave a history of working in COVID area of hospital, while 130 (40.25%) HCWs that were infected while working in non-covid areas. 57 (17.65%) HCWs gave a history of performing aerosol generating procedures in the COVID area. Of the total 323 HCWs who tested positive, 257 (79.57%) had received infection control training related to COVID-19 (Table 1).

When HCWs reported to the flu OPD, the most common symptom reported was fever which was reported by 157 (18.89%) HCWs, followed by myalgia seen in 117 (36.22%) cases, cough found in 67 (20.74%) cases, malaise seen in 61 (18.89%) cases, sore throat in the 55 (17.03%) cases and headache in the 51 (15.79%) cases.

Table 1: Clinico-epidemiological profile of COVID-19 positive HCWs.

Characteristics	Frequency, (n=323) (%)
HCWs positivity by test	
RT-PCR positive	312 (96.60)
Rapid antigen positive	11 (3.40)
Asymptomatic/symptomatic	
Symptomatic	284 (88)
Asymptomatic	39 (12)
Gender	
Male	145 (44.89)
Female	178 (55.11)
Age (years)	
21-30	201 (62.23)
31-40	68 (21.05)
41-50	42 (13)
>50	12 (3.72)
Category of HCW	
Staff nurses	137 (42.41)
Doctors	97 (30.03)
Ancillary staff	58 (17.96)
MPW	31 (9.60)
Years of experience (Years)	
<5	206 (63.78)
>5	117 (36.22)
Accommodation	
Hostel	91 (28.17)
Residence	232 (71.83)
Covid duty	
Yes	193 (59.75)
No	130 (40.25)
HCWs involved in aerosol generating procedures	
No	266 (82.35)
Yes	57 (17.65)
Trained in infection control practices	
Yes	257 (79.57)
No	66 (20.43)
Co-morbidities	
Diabetes	6 (1.86)
Hypertension	10 (3.10)
Cardiac	2 (0.62)
Asthma	6 (1.86)
Hypothyroidism	2 (0.62)
Total	28 (8.66)
Social distancing during meals	
Always	170 (52.63)
Sometimes	108 (33.43)
Never	45 (13.93)

Other symptoms like anosmia, vomiting, loss of taste, diarrhea and breathlessness were seen in small proportion of HCWs, as shown in the (Figure 1).

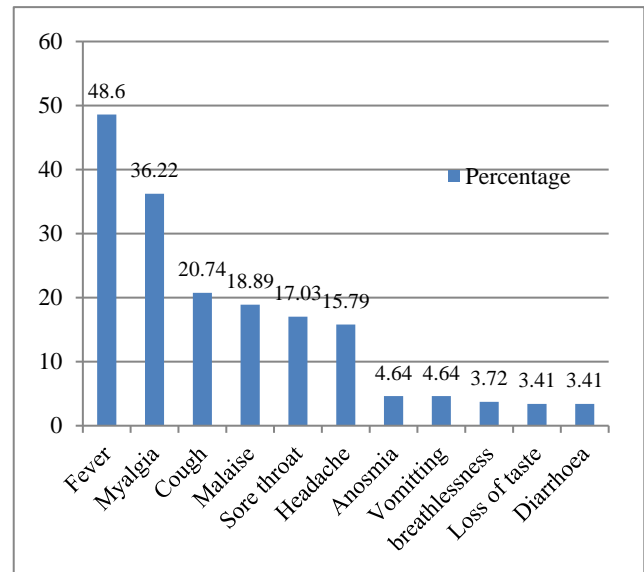


Figure 1: Percentage of HCW's presenting symptoms.

308 (95.35%) HCWs had mild infection while 13 (4.02%) HCWs suffered moderate infection and only 2 (0.62%) developed severe infection.

Co-morbidities were seen in 28 (8.14%) of HCWs of which hypertension was most common and was seen in 10 (3.1%), HCWs. Other co morbidities found were diabetes which was found in 6 (1.86%) HCWs followed by asthma in 6 (1.96%) cases and cardiac conditions and hypothyroidism found in 2 (0.62%) cases of HCWs respectively.

In 151 (46.75%) HCWs the probable source of infection was from hospital and in 79 (24.46%) HCWs it was from the community. No source was identified in 93 (28.79%) cases. The 15 HCWs who acquired infection from community gave a history of exposure to COVID positive family members. Among those who acquired COVID-19 in the hospital, 80 (52.98%) acquired the infection from a confirmed positive COVID-19 HCWs and 71 (47.01%) from the infected patients. This was deduced from the history of exposure provided by them.

DISCUSSION

The present study was conducted to analyze SARS-CoV-2 infections among HCWs in a tertiary care hospital with emphasis on the clinical and epidemiology data. Out of 921 HCWs tested, 323 (35%) were positive for SARS-CoV2 and the percentage of infected HCWs was 13.67% (323/2362) which is comparable to a study by Gracia et al. In their study out of 652 tested, 213 (32.6%) HCWs were COVID-19 positive and percentage of COVID-19 HCWs was found to be 11.1% (213/1911).⁹ Behera et al in their

review of existing literature found 3.04% prevalence of COVID-19 positivity among HCWs from 24 studies.¹²

There was predominance of females (55.11%) among infected HCWs. This could be due to the large number of female nurses working in our hospital. Similar observations were noted by Wang et al and Zheng et al.^{13,14} In their study they found 61.25% and 72.28% female preponderance respectively. While in a study by Fusco et al in Italy, only 15 (49%) of females were infected.¹⁵ In an Indian study by Banerjee et al 43% of infected HCWs were females.¹⁶

In our study younger age group (21-30 years) was infected the most (62.23%) when compared to other age groups. Being a teaching hospital there is a larger number of interns, resident doctors and nurses of younger age working in the hospital and also posted in COVID area. This also explains why majority of the HCWs (63.78%) had <5 years of experience. As per the hospital policy HCWs above the age group of 60 were considered as high-risk group and were not posted in COVID area, so only 12 (3.72 %) of HCWs were above the age of 50 years. While in a study by Chen et al the median age of infected HCWs was 32 years among the infected HCWs.¹⁷ Al Maskari et al in their study reported 88 (43.1%) HCWs in the age group 26-35 years while Gracia et al reported 42 years as a mean age of HCWs.^{9,11}

Nurses were found to be the predominantly affected HCWs (42.41%) followed by doctors. This is probably due to persistent and longer exposure of nurses while working in COVID areas. Similar predominance of nursing staff was reported by Wang et al, while Zheng et al reported 52.06% nurses and 33.62% doctors among infected HCWs from Wuhan.¹³

Training on COVID-19 infection control practices and use of PPE was given by infection control department to all categories of HCWs before they were posted in the COVID areas. A total of 96 training sessions were conducted and 1800 HCWs were given training. Out of infected HCWs, 257(79.57%) had undergone training.

Out of the 151 (46.75%) HCWs, whose probable source of infection was from the hospital, 80 (52.98%) HCWs gave a history of exposure to infected HCWs. During COVID-19 pandemic HCWs were undergoing lot of stress. Interacting with colleagues was a way of stress relief for them. 170 (52.63%) HCWs followed strict social distancing during meals. This was evident from the history given by them. Maximum risk of exposure is during mealtimes. Al Maskari et al also reported 35% of hospital-acquired infections among HCWs as a result of contact with another infected colleague, particularly during 'break' times, as the HCWs were not compliant with social distancing and universal masking policies during having meals.¹¹ In 71 (47%) HCWs, the probable source of infection was from COVID-19 positive patients. This was evident from the history given by them. Exposure from asymptomatic patient especially in non-COVID area, or during aerosol generating procedures, or break in the

infection control protocols regarding PPE while handling COVID-19 patients could be the probable reasons for exposure. There were 5 clusters of infection (Emergency department, Cathlab, ICU and NICU) in the hospital.

In our study, community source was found in 79 (24.45%) HCWs, based on the history given by them. This was more common among the ancillary staff. HCWs gave a history of travelling, shopping in crowded places, attending social gatherings and contact with infected family members. The 15 HCWs who acquired infection from community gave a history of exposure to COVID positive family members.

284 (88%) HCWs were symptomatic while 39 (12%) were asymptomatic. Contact tracing of all the symptomatic HCWs was carried out in our hospital to prevent spread of infection among the HCWs. Emphasis was given on asymptomatic contacts from the same department and hostel. The accommodation details of the infected HCWs, revealed that 91 (28.17%) had taken shared hostel accommodation. They were mostly residents and junior nursing staff. Asymptomatic HCWs were responsible for spreading the infection to their roommates. 2 clusters were found with more than 5 HCWs in the resident's and nurse's hostel.

In the present study majority of the HCWs (95.35%) suffered from mild symptoms. Similar observations were noted by Marjolein et al.¹⁸ Only 2 (0.62%) of the infected HCWs were admitted in ICU with severe infection. In our study, rates of severe disease among HCWs are lower than other studies. In a literature review of COVID 19 among HCWs, Behera et al reported 4.08% severe disease among 4353 infected HCWs.¹²

In the present study one HCW who was admitted in ICU for a prolonged period, recovered and joined duties after 2 months. However, the rest of the HCWs recovered and joined duty after 17 days. There was 1 (0.32%) mortality among the infected HCWs. Bandyopadhyay et al in their systematic review reported 0.92% (1413/152888) mortality among COVID 19 HCWs.¹⁹ Younger age group and few comorbidities could be the reason for good outcome among infected HCWs from our hospital.

In the month of April 2020 there were no COVID-19 infections among HCWs. From the month of May 2020, HCWs started getting infected. Maximum (109) number of HCWs got infected in the month of July. This coincided with peak of COVID-19 patients admitted in the hospital. There was decrease in the number of COVID 19 infected HCWs from August 2020. The number of infected HCWs reduced to 20 by the month of October 2020, as many strict infection control protocols were implemented from August 2020 to control infections among HCWs.

CONCLUSION

HCWs face a high risk of getting infected by the COVID-19 infection while providing care for suspected or confirmed COVID-19 patients. In our study nurses were

the most affected group of HCWs. Due to younger age group and with minimal co morbidities most of the HCWs suffered from mild symptoms. The peak of COVID-19 among HCWs was reached in the month of July 2020. Regular training of all categories of HCWs regarding infection control practices related to COVID-19 and their strict implementation should be an essential component of preventive strategy. Early recognition, identification, isolation, and implementation of appropriate infection prevention and control measures are imperative for successful management of COVID-19 in HCWS.

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