

ORIGINAL RESEARCH

Demographic and Clinical Characteristics of Covid-19 Infection among Female Healthcare Workers at a Tertiary Care Hospital, In South India: A Prospective Study

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ABSTRACT

Background: The outbreak of COVID-19 has underscored the need to explore gender-specific preparedness and response strategies, as the reverberations of the pandemic are contingent upon both social and physical factors. Hence, this study aimed to elucidate the demographic and clinical characteristics of COVID-19 infection among female healthcare workers (HCW) in a tertiary care hospital in Tamil Nadu, India. **Methods:** A total of 980 healthcare workers were included in the study, and data were collected from 1st May 2020 to 31st April 2021. The prevalence of COVID-19 infection was determined, along with an examination of the distribution of infected cases among different professional categories. Symptomatology data were analyzed along with the prevalence of comorbidities among the infected individuals. Data analysis was conducted using SPSS version 21.0 to identify trends and patterns related to COVID-19 infection. **Result:** The analysis revealed that 16.5% (95% CI: 14.3-19.1) of female healthcare workers within the institution were infected with COVID-19 since May 2020. Among the infected cases, nurses accounted for 47.8%, doctors for 33.8%, and other healthcare workers for 18.4%. The most prevalent symptoms among the infected individuals were fever (28%), cough (25%), and myalgia (22%). The incidence of infection declined after vaccination with 14.3% before vaccination and at 2.3% after vaccination. **Conclusion:** Comprehensive protection measures against the pandemic should be extended to all healthcare workers, ensuring that no one is left behind. By addressing the unique challenges faced by female healthcare workers, we can strengthen their resilience and contribute to the overall containment of the outbreak.

Key words: COVID-19, female health care workers, India.

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INTRODUCTION

The COVID-19 pandemic has displayed unprecedented challenges to healthcare systems worldwide, with healthcare workers at the forefront of

the response efforts.^[1] Healthcare workers (HCW) are at higher risk of exposure to COVID-19 due to their close and prolonged contact with infected patients, thereby increasing the potential for virus transmission

to both colleagues and the general population.^[2] Female healthcare workers constitute a significant proportion of the global healthcare workforce and notably, the World Health Organization has reported that approximately 70% of the global healthcare workforce consists of women, making them the primary responders in mitigating the outbreak while simultaneously being at the forefront of contracting the disease.^[3] However, they are also at an elevated risk of COVID-19 infection due to their close proximity and direct contact with infected individuals.^[4] Emerging evidence suggests that gender-specific differences exist in the susceptibility, severity, and outcomes of COVID-19 infection.^[5,6] Given the distinct experiences and challenges faced by female healthcare workers, it is imperative to explore these differences within this specific population. Investigating the demographic and clinical characteristics of COVID-19 infection among female healthcare workers in this setting can contribute to a comprehensive understanding of the impact of the pandemic on this specific population. By shedding light on the unique challenges faced by female healthcare workers, this study aimed to elucidate the demographic and clinical characteristics of COVID-19 infection among female healthcare workers in a tertiary care hospital in Tamil Nadu, India. This helps to inform the policy makers to develop evidence-based interventions and policies that safeguard the health and well-being of these essential frontline workers. The findings of this study will also have implications for healthcare institutions and policymakers aiming to develop targeted measures to mitigate the risks and support the needs of female healthcare workers during the ongoing pandemic

MATERIALS AND METHODS

Study Setting

This longitudinal follow-up study was conducted at Government Chengalpattu Medical College Hospital, a tertiary care hospital in Tamil Nadu, India. The hospital serves as a critical healthcare hub for a large population in the region and provides comprehensive medical services. It is also designated as a dedicated COVID-19 Hospital for the district, catering to approximately 25 lakhs population.

Sampling Strategy and Sample Size

A total of around 980 female healthcare workers were employed at the institution during the study period. For the purpose of this study, healthcare workers were defined as “individuals working within the institution who had direct contact with patients or patient care materials, including doctors, nurses, hospital cleaners, laboratory workers, and ancillary healthcare staff”.^[7] As an exploratory study, formal sample size calculations were not performed. Therefore, all female healthcare workers who tested positive for SARS-CoV-2 were included as eligible participants in

the study.

Study procedure and tools

The study was conducted from 1st May 2020 to 31st April 2021, with all healthcare workers under surveillance. Symptomatic healthcare workers were followed up and advised to undergo Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) testing in the COVID triage area. A standardized structured Case Investigation Format (CIF- FORM A) from the National Centre for Disease Control (NCDC) of India was completed for all SARS-CoV-2-positive cases, regardless of their admission status. Daily reports from the COVID triage area were reviewed to identify any healthcare workers testing positive for COVID-19. Data on all selected study subjects, comprising female healthcare workers who contracted SARS-CoV-2 infection from 1st May to 31st April 2021, at Chengalpattu Medical College Hospital, were obtained from the filled Case Investigation Formats (CIFs). Data were collected using a structured questionnaire specifically developed for this study. The questionnaire consisted of two sections: demographic information and clinical characteristics. Demographic information included age, professional role, years of experience, and comorbidities, while clinical characteristics encompassed symptoms experienced, date of symptom onset, history of contact with COVID-19 cases, vaccination status, and any previous COVID-19 testing. Additionally, all healthcare workers who tested positive were contacted by phone for clarifications or to address any unfilled data in the Case Investigation Format. A follow-up call was also made after 28 days to inquire about the persistence of symptoms to assess post-COVID-19 sequelae. Participants with incomplete or missing data, or those who could not be reached by phone after two attempts, were excluded from the analysis.

Ethical considerations and Data management

The study was started after obtaining approval from the Institute Ethics Committee. Verbal consent was obtained from each participant before their inclusion in the study. The study was conducted in accordance with the principles outlined in the Declaration of Helsinki. Confidentiality and privacy of participant information were strictly maintained throughout the study. All collected data were anonymized and securely stored to protect participant identities. To ensure data quality, the principal investigator cross-checked 10% of the data by comparing it with the filled CIFs and conducting telephone verification for randomly selected participants.

Statistical Analysis

Data was transferred to Microsoft Excel and analysis was conducted using SPSS version 21.0.

Normality of the data was checked statistically by Shapiro Wilk test. Descriptive statistics were used to summarize demographic characteristics, clinical features, and prevalence of COVID-19 infection among female healthcare workers and 95% confidence interval was constructed for the prevalence of COVID-19 infection among HCW. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as mean \pm standard deviation or median with interquartile range, depending on the distribution of the data. A p-value $<$ 0.05 was considered statistically significant.

RESULT

The mean age of female healthcare workers (HCWs) affected by SARS-CoV-2 infection was 33.3 ± 9.7 years. The majority of the affected population (53%) fell within the 25-35 years age group. Among the 980 female healthcare workers who were followed up between 1st May 2020, and 31st April 2021, a total of 162 acquired SARS-CoV-2 infection and provided consent to participate in this study, as depicted in Figure 1.

The period prevalence of SARS-CoV-2 infection among female healthcare workers in the institution was found to be 16.5% (95% CI: 14.3-19.1). Notably, a statistically significant proportion of the affected healthcare workers were females (59%) compared to males, as shown in Figure 2 (p-value $<$ 0.001). Among the 162 female healthcare workers affected, 48% were staff nurses, 34% were doctors, and 18% were lab technicians and other staff, as illustrated in Figure 3.

The most prevalent symptoms among the infected participants were fever (28%), cough (25%), and myalgia (22%), as indicated in Figure 4. The infection rate of COVID-19 varied among different categories of female HCWs, with staff nurses having the highest rate (35%), followed by lab technicians (14.6%) and doctors (14.2%), as presented in Table 1.

Approximately 21% of the participants had existing comorbidities, as depicted in Figure 5. Regarding management, 34% of the infected cases received home quarantine, while the remaining individuals received institution care and were subsequently discharged. The incidence of infection before vaccination was 14.3% and after vaccination was 2.3%, as shown in Figure 6.

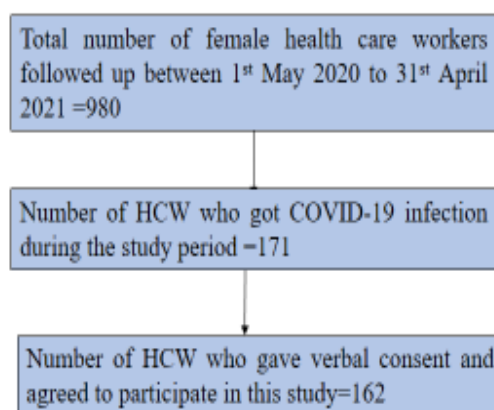


Figure 1: Flow of the study participants

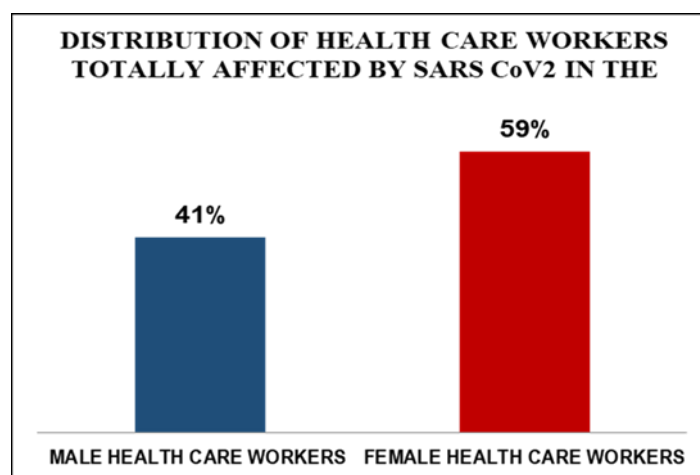


Figure 2: Distribution of COVID-19 cases based on gender

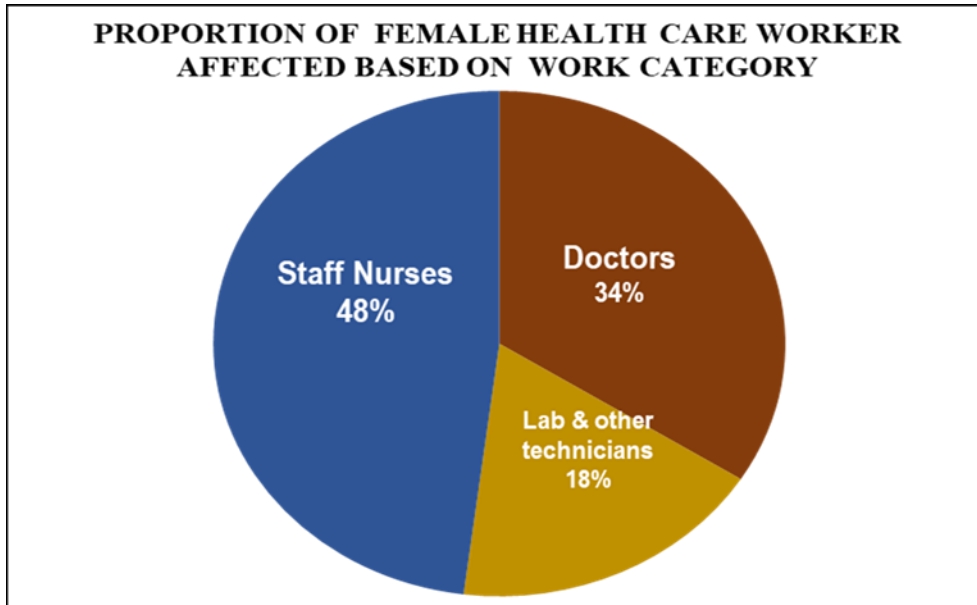


Figure 3: Distribution of COVID-19 cases based on the designation of the female HCW

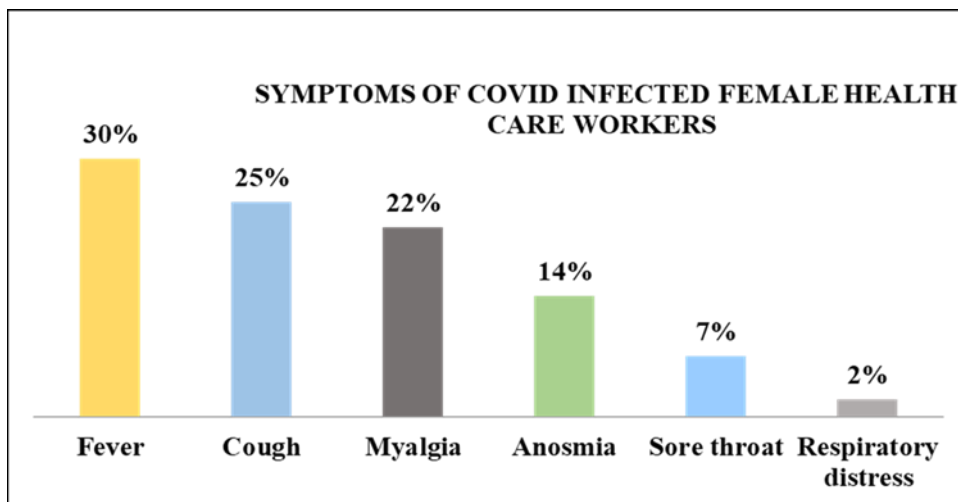


Figure 4: Distribution of symptoms of COVID-19 among the infected female HCW

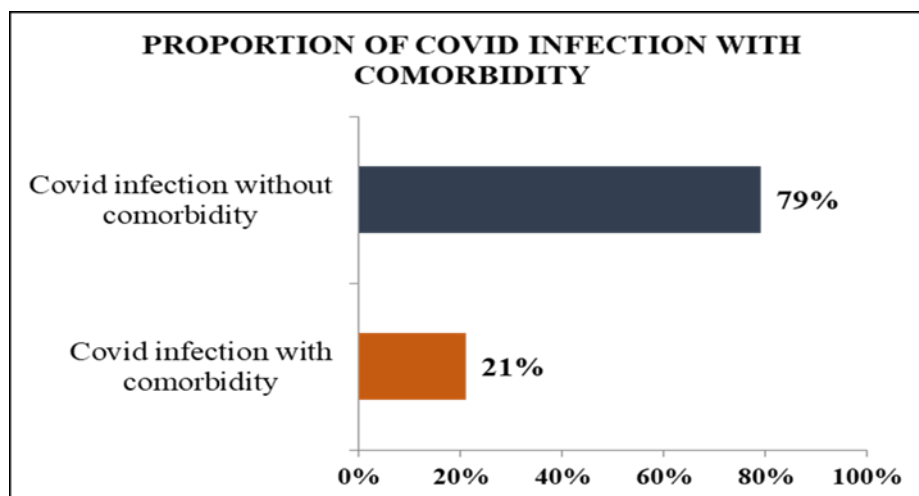


Figure 5: Distribution of COVID-19 infected female HCW based on the existing comorbidity

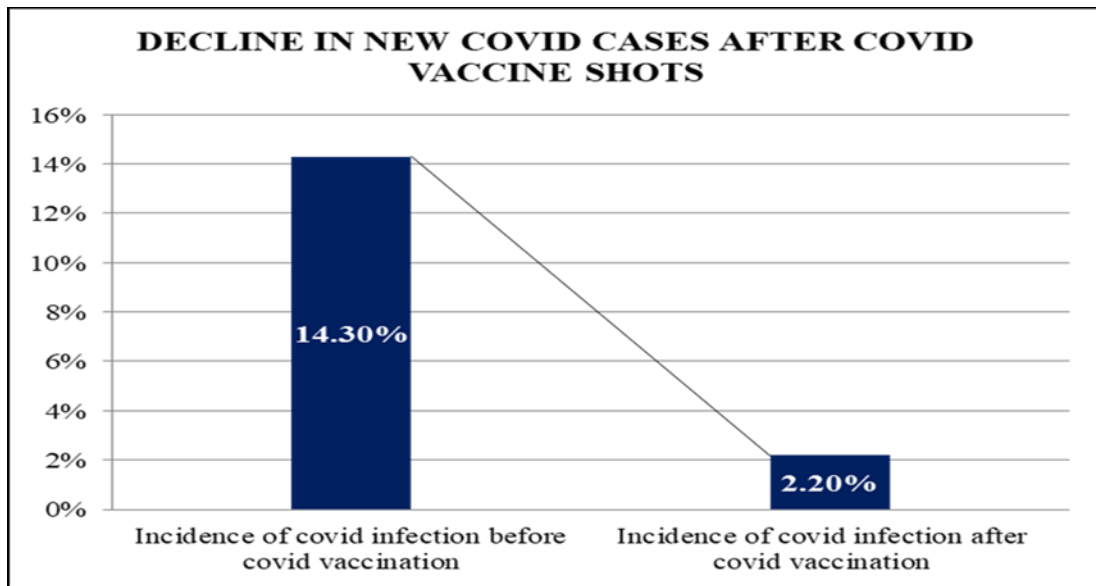


Figure 6: Distribution of COVID-19 infected female HCW based on their vaccination status

Table 1: Distribution of COVID-19 infected female HCWs based on the designation

Work category	Female HCW in position	Females HCW affected	Percentage (%) infected
Senior and Junior Doctors	154	22	14.2%
UG & PG Students	320	34	10.6%
Staff nurses	220	77	35%
Technicians & clerical staffs	82	12	14.6%
Housekeeping & other staffs	204	17	8.3%

DISCUSSION

This longitudinal follow-up study was conducted to estimate the prevalence of COVID-19 infection among the female HCW and to analyze their sociodemographic details and clinical details which will help us to make tailored interventions to mitigate the risks of COVID-19 infection. The period prevalence of SARS-CoV-2 infection among female healthcare workers in this hospital-based study was found to be 16.5% (95% CI: 14.3-19.1).

Various studies have been conducted in India to estimate the burden of SARS CoV-2 infection among HCW.^[8] The reason for increased rate of COVID-19 infection in females might be due to the fact that most of the frontline healthcare workers are females.^[9] This is supported by a study conducted by WHO which states that 70% of the social and medical workforce are females. A cross-sectional study conducted by Chandran et al. in Kerala among the healthcare workers showed that cases of COVID-19 infection is more among the female HCW (61.3%) when compared to males.^[10] A cohort study conducted in Spain, revealed that 72% of infected healthcare workers were women (5,265) and another similar study conducted in Italy, estimated that 66% of infected healthcare workers were women (10,657).^[11,12] Another cross-sectional study conducted by Jamil et al. in Meghalaya found that the COVID-19 infection ratio between males and females

was 0.4:1. A similar study was conducted by Mohan et al. in Chennai found that females were more commonly infected than males.^[13] All these results are consistent with our study's findings.

The mean age of our study participants was 33.3 years which is little higher than other similar studies conducted in India.^[10,14] In our study, among the females healthcare workers, staff nurse were the most commonly affected people when compared to other cadres. This is consistent with the finding from another similar study conducted among healthcare workers.^[14] Whereas some studies show that doctors/residents were most commonly affected.^[10,15] The reason for this difference might be due to their individual hospital mandates which outline the roles and responsibilities of the healthcare workers for the COVID-19 patient care services and management.

In our study, among those who were infected with SARS CoV-2 infection 21% had pre-existing comorbidities. This is similar to another study conducted by Stock et al.^[15] In our study, the most common symptoms were fever, cough and myalgia. This finding is consistent with the results from other similar studies conducted among the healthcare workers.^[10] No mortality was observed among the affected female health care workers in the study setting. There observed a decline in new infection rate and oxygen requirement after vaccination which signifies the benefit of vaccination.

The timely identification and isolation of individuals at risk, particularly among nursing professionals, medical doctors, specialists, and healthcare assistants who regularly interact with patients and are at higher susceptibility to infection, play a crucial role. It is essential for healthcare organizations to proactively strategize in advance to guarantee the well-being of both patients and the entire healthcare workforce.

The COVID-19 pandemic has underscored the significant occupational health risks healthcare workers face due to exposure in healthcare settings. Additionally, it has highlighted the potential jeopardy to the continuity of critical care services during public health emergencies. Hence, it is imperative to prioritize interventions that minimize the risk of infection and ensure the resilience of healthcare systems in the face of such challenges. Gaining a deeper comprehension of the mechanisms behind healthcare-worker infection with SARS-CoV-2 is crucial to safeguarding this vital segment of the workforce and reducing their contribution to the transmission of COVID-19 within healthcare settings and the wider community.

COVID-19 presents a crucial moment to enhance the development of gender-responsive crisis preparedness plans within the health sector. Failing to account for gender dynamics in such plans will perpetuate and worsen existing gender disparities, leading to an uneven distribution of adverse consequences primarily affecting women healthcare workers. By prioritizing gender-sensitive approaches, we can address the unique challenges faced by women in healthcare during crises and work towards equitable outcomes for all.

It is important to acknowledge the limitations of this study. Firstly, though it is a prospective study design, we assessed both the outcome and the exposed at the same time which hinders the establishment of causal relationships. Secondly, the study was conducted solely at a single tertiary care hospital, which restricts the generalizability of the findings to a broader population. Lastly, the reliance on self-reported data for symptoms and exposures introduces the possibility of recall bias. Additionally, since the data collection was based on available records during the pandemic, there may be inherent biases in the data. To gain a more comprehensive understanding of the risk of infection, reinfection, and post COVID-19 syndrome, long covid among healthcare workers, a large cohort study would be more appropriate.

CONCLUSION

This study presents the period prevalence of COVID-19 infection specifically among female healthcare workers (HCWs), revealing a significantly high rate. These findings hold significant importance in raising

public awareness, offering valuable insights for government agencies to devise effective strategies, and enhancing preventive measures to curtail the transmission. Further research is warranted to gain a deeper understanding of the gender-specific aspects of the COVID-19 pandemic, aiming to enhance pandemic response measures for all populations, including healthcare workers.

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