

Breakthrough Cases of COVID-19 among Healthcare Workers: A Case Series

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ABSTRACT

Breakthrough infections after Coronavirus Disease-2019 (COVID-19) vaccinations are an expected phenomenon as no vaccine is 100% effective. Healthcare Workers (HCW) are at a higher risk of contracting the infection owing to the exposure at the workplace. This case series describes clinical profile of 27 breakthrough infections after two weeks of second dose of vaccination. Of the total HCWs with the COVID-19 infection during the study period, 21.77% were breakthrough infections. The mean age of these HCWs was 36 ± 12.02 years. The mean interval between the second dose of vaccine and being detected COVID-19 positive was 24.41 ± 7.69 days. Majority of them were doctors (66.67%) and nurses (14.81%). All of them suffered from mild disease and recovered fully. Availability of vaccines coupled with pandemic fatigue has led to false reassurance among population. Hence, COVID-19 Appropriate Behaviour (CAB) before and after vaccination should be followed rigorously to prevent such infections.

Keywords: Coronavirus disease-2019, Pandemic, Postvaccination infection, Vaccination

INTRODUCTION

A nationwide vaccination campaign has been one of the foremost steps implemented to tackle the coronavirus infection in several countries across the world. The Coronavirus Disease-2019 (COVID-19) vaccination campaign started in India on January 16th 2021. Two vaccines used for this drive were Oxford-AstraZeneca's Covishield and Bharat Biotech's Covaxin. Healthcare Workers (HCWs) were given the first priority to receive the vaccination. Vaccinated people are contracting COVID-19 infection following complete vaccination [1,2]. These breakthrough cases are expected phenomena as no vaccine is 100% effective in preventing illness. Covishield is estimated to have an efficacy of 62-90% whereas, Covaxin is estimated to have 81% efficacy [3,4]. HCWs are at a higher risk of contracting the infection owing to the exposure at the workplace. Cases of recurrences have also been reported among them [5,6]. Reporting breakthrough cases provides vital information regarding clinical profile and CAB following vaccination. Through this case series, authors report 27 vaccine breakthrough cases of COVID-19 amongst HCWs of a tertiary care Institute in Mumbai.

CASE SERIES

All HCWs in the Institute were offered the Covishield-ChAdOx1 nCoV-19 Corona vaccine from 16th January 2021, and the second dose was offered after a gap of four weeks. The data regarding HCWs has been obtained from contact tracing records maintained by the Department of Community Medicine for all the HCWs during the pandemic of COVID-19. A breakthrough case of COVID-19 is someone who tested positive ≥ 14 days after receiving both doses of vaccine [7]. Among the total 124 HCWs who were positive during the study period, i.e., 26th February (14 days after starting second dose) to 31st March 2021, 17 HCWs (13.71%) had received only the first dose of vaccination, and 38 (30.65%) had received the second dose. Rest were not vaccinated. Of these 38 HCWs, 27 cases were breakthrough infections. All of these HCWs were in service of

COVID-19 patients in rotation since the beginning of pandemic. The clinical epidemiological profile of 27 breakthrough cases of COVID-19 among HCWs in the institute has been presented in [Table/Fig-1].

Patient characteristics		n,%
Age (Mean \pm SD) years		36 \pm 12.02 (Range 19-59 years)
Sex	Male	13 (48.15%)
	Female	14 (51.85%)
Designation	Doctors	18 (66.67%)
	Nurses	4 (14.81%)
	Other support staff	5 (18.52%)
Co-morbidities	Present	5 (18.52%)
	Absent	22 (81.48%)
Type of test	Rapid antigen test	2 (7.41%)
	Reverse transcriptase polymerase chain reaction	25 (92.59%)
Reason for testing	Symptoms	22 (81.48%)
	Post exposure to positive patient	3 (11.11%)
	Travel	1 (3.7%)
	Presurgical screening	1 (3.7%)
COVID appropriate behaviour (CAB)	Followed rigorously even after vaccination	19 (70.37%)
	Less careful with CAB after vaccination	8 (29.63%)
Source of infection	Unknown/Community spread	17(62.96%)
	Exposure to positive family/friends	5 (18.52%)
	Inadequate Personal Protective Equipment (PPE)/Breach of PPE at work	5 (18.52%)

[Table/Fig-1]: Patient characteristics of breakthrough cases of COVID-19 among HCWs (N=27).

Vaccination history: After receiving the first dose, 15 (55.56%) cases had minor symptoms like fever, sore throat, headache, myalgia, local arm pain. The mean duration of these symptoms was 15.11 hours (1-48 hours). After receiving the second

dose, three of these cases had symptoms like headache, fever, and local arm pain. Twelve (44.44%) cases did not have any symptoms after receiving vaccination. This was based on contact tracing records. It does not contain the data regarding symptoms/adverse events following vaccination. Hence, these could not be assessed.

Clinical history: The mean interval between the second dose of vaccine and HCW being detected COVID-19 positive was 24.41 ± 7.69 days (14-42 days). All the cases had contracted COVID-19 for the first time except for one female doctor, for whom this was the second episode. She was previously positive 10 months back and had completely recovered. The most common symptoms were fever (12 cases), followed by sore throat (8 cases), cough (7 cases), and myalgia (6 cases). The mean duration of symptoms was 3.52 ± 2.83 days (1-11 days). Total 14 HCW (51.85%) were home isolated and the rest were admitted to the hospital. The reason for hospital admission was non availability of a home isolation facility (10 cases) and co-morbidities (3 cases). All the cases are stable and have completed their period of isolation of 17 days. All of them have tested negative at the end of isolation.

DISCUSSION

An unmitigated pandemic with uncertain treatment guidelines and variable prognosis triggered the innovation to produce vaccines at an unforeseen pace to tackle the virus.

In the present case series, of the total numbers of HCWs who were infected during the study period, the proportion of breakthrough cases was 21.77%. Due to the unavailability of the total number vaccinated at the institute, it is difficult to comment on the incidence of breakthrough infections. Also, 11 cases were infected between 1-14 days of taking the second dose hence, cannot be called vaccine breakthrough infections. The mean age of the breakthrough cases was 36 ± 12.02 years. A prospective cohort study done in Israel, conducted from January to April 2021, reported 2.6% (39/1497) breakthrough infections among fully vaccinated HCWs [8]. Amit S et al., reported that the proportion of postvaccination COVID-19 among HCWs of Israel was 0.54% (22 cases). However, none of the cases were breakthrough infections. The mean age of these HCWs was 45.3 ± 9.85 years and the median duration between vaccination and onset of symptoms was 3.5 days (range 0-11 days) [2]. In another study by Keehner J et al., it was reported that, of the 37 HCWs who tested positive after complete vaccination, only seven HCWs had tested positive ≥ 15 days after the second vaccination [1]. Pre-existing exposure/early exposure after vaccination, risk compensation behaviour, pandemic fatigue, mutations in the viral genome, insufficient immune response could have contributed to acquiring COVID-19 infection after vaccination. HCWs have increased exposure to the virus in their work environment too.

In the present study, majority (22 cases) tested because they were symptomatic. Similar to the present study findings, Amit S et al., also reported that, of the 22 HCWs who had developed infection postvaccination, majority (13 cases) tested due to symptoms, two cases tested as they reported symptoms upon questioning and rest tested due to well-defined exposure to a positive patient [2]. Therefore, even in breakthrough infections, mild symptoms are possible and COVID-19 testing should be done immediately.

All cases of breakthrough infection in this series experienced no symptoms to only mild symptoms. The mean duration of

symptoms was also less (3.52 days). A recent study published in Lancet shows 66.7% percent overall efficacy of Covishield vaccine after 14 days of vaccination against symptomatic COVID-19 and 76% efficacy against COVID-19 in the first 90 days after vaccination [9]. Trials have also suggested similar findings with the absence of severe symptoms in breakthrough cases as well as a decrease in the incidence of COVID-19 in the vaccinated group as compared to the control group [10]. A recent study conducted among hospitalised patients with symptomatic COVID-19 found out that, as compared to unvaccinated patients, vaccinated patients are less likely to require intensive care (25% vs 40%), mechanical ventilation (7.7% vs 23%) and less likely to die (6.3% vs 8.6%) [11]. Similar findings were reported in a study by Wang SY et al., wherein a shorter mean duration of hospitalisation (10.8 days vs 13.1 days), lower risk of advanced oxygen or ventilatory support (32% vs 51%) and lower in-hospital mortality (10% vs 12%) was observed among breakthrough COVID-19 infections as compared to unvaccinated [12].

The "Peltzman effect" results in risk compensation and its effects leading to increased violation of CAB have been found after vaccination too [13]. In the present series too, 30% of the cases admitted to having a lapse in CAB.

CONCLUSION(S)

Breakthrough cases of COVID-19 although rare do occur. Along with a decline in compliance to CAB and false sense of reassurance due to availability of vaccines, breakthrough cases could facilitate further spread of COVID-19 infection. To prevent further infections, morbidity and mortality due to COVID-19, compliance to CAB prior to as well as postvaccination should be ensured in conjunction with continuous testing and contact tracing of symptomatic people.

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