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Brief Report

Uptake and impact of vaccination against COVID-19 among healthcare workers-evidence from a multicentre study



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To assess vaccination among healthcare workers, 14837 healthcare workers across 20 different hospitals were prospectively surveyed. The overall uptake of the vaccine was 13335(90%). Infection rate in vaccinated HCW was 710(6.04%) and was significantly lower than unvaccinated HCW 148(9.9%), $P < .001$. Uptake of vaccination among healthcare workers in our study was high and provided significant protection compared to unimmunized healthcare workers.

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Vaccination of healthcare workers against Coronavirus Disease 2019 (Covid-19) infection has been 1 of the top priorities globally. However, hesitancy to be immunized has been observed among the general population,¹ medical students² as well as healthcare workers.³ Concerns about unknown side effects, doubts over safety and efficacy, apprehension among pregnant and breastfeeding women, race, gender, religious beliefs, misinformation, and conspiracy theories have all played their part in propagating this hesitancy.^{1,4} Strategies based on evidence and at individual, interpersonal and organizational levels have all been advocated to reduce hesitancy and improve uptake.⁵ The aim of this study was primarily to assess the uptake of vaccination against covid-19 by HCWs and the immunity offered by vaccination programs against symptomatic covid-19 infection, hospitalization, and mortality.

METHODOLOGY

Healthcare workers (HCW) across 20 different hospitals were prospectively surveyed as part of the study. The healthcare workers included doctors, nurses and paramedics. All the institutions maintained a database that included the vaccination history of healthcare workers. Interrogation of this database was carried out along with

questionnaire survey to acquire the data for all healthcare workers in these institutions. Institutional Ethics committee approved the study. Reverse transcription polymerase chain reaction (RT-PCR) was used to confirm the diagnosis in HCWs presenting with symptoms of fever, cough, un-explained malaise or with a history of contact with a Covid-positive case. The Covid positivity rate was calculated 14 days after the second dose and compared with those unvaccinated. Need for hospital admission and mean duration of hospitalization were also recorded.

Persistent low oxygen saturations ($\leq 94\%$) on room air as well as moderate (respiratory rate 24–20) and severe (>30) breathlessness were the main criteria for admission to hospital. Laboratory parameters like CRP >40 , Ferritin >500 , D-Dimer >0.5 , LDH >300 , IL-6 >5 along with degree of lung involvement on CT scan in selected cases complemented the decision making for hospital admission.

Failure to maintain oxygen saturations above 90% on 6–8 litres of oxygen, hemodynamic instability and need for inotropic support, hypercarbia on arterial blood gases (ABG), altered sensorium, onset of organ failure were the important criteria for ICU admission.

RESULTS

14837 HCWs across 20 centres were included in the study. The number of HCWs across different institutions ranged from 69 to 4499. The overall uptake of the vaccine was 13355(90%) in the entire study population. At the time of the survey 2259(15.2%) HCWs had received a single dose of the vaccine and 11096(74.7%) had received both doses. 1482(9.9%) had not taken the vaccine at all. The vaccines used included the adenovirus vectored ChAdOx1 nCoV-19 vaccine –

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Table 1
Outcome between vaccinated and unvaccinated health care workers

	Fully vaccinated (11096)	Unvaccinated (1482)	P value
Hospitalization	182 (1.64%)	22 (1.48%)	.65
ITU admission in all patients	4 (0.03%)	1 (0.06%)	.92
ITU admission in hospitalized patients	4 (2.19%)	1 (4.4%)	.5
Deaths	0 (0%)	0 (0%)	

AZD1222 and the inactivated severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) vaccine (BBV152).

The study population consisted of a similar number of males (48.9%) and females (51.1%) with a mean age of 38.3±11.7. The mean body mass index (BMI) was 25.2±4.2. Presence of co-morbidities like diabetes (3.76%) and hypertension (4.09%) was low. 5.6% of the study population reported another co-existing disease and 1.1% of the study population reported being on steroids or other immunosuppressants. 2685(22.1%) of the patients gave a history of contact with a covid case in 2 weeks preceding the infection. There were no significant differences between the groups with respect to any of these variables.

The uptake of vaccination was highest among senior doctors with only 37(2.9%) of the senior doctors not getting vaccinated. The lack of uptake was 1273(11.4%) among the nursing and paramedical staff, 141(7.5%) among junior doctors and trainees and 35(5.5%) among the administrative staff.

The total number of HCWs detected positive for Covid-19 was 838 (5.64%). Infection rate among vaccinated HCW was 710(6.4%) and was significantly lower than unvaccinated HCW 148(9.9%), $P < .001$. The relative risk (RR) for Covid infection in unvaccinated patients was 1.56(95%CI 1.31 to 1.84), $P < .0001$. The number needed to treat (NNT) was 27.8. Thus, 28 patients were required to be vaccinated to protect 1 patient from Covid infection.

182(1.64%) HCWs in the fully vaccinated arm required hospitalization compared to 22(1.48%) in the unvaccinated arm., $P = .65$. The need for ITU admission was similar among vaccinated and unvaccinated patients in the entire cohort. (Table 1). Among the hospitalized patients, the number of healthcare workers requiring ITU admission was 4(2.19%) in the fully vaccinated arm and 1(4.54%) in the unvaccinated arm. The risk of needing ITU admission was twice as high in the unvaccinated group, however, this difference was statistically non-significant RR of 2.06[95%CI 0.24 –17.6], $P = .5$. No mortality was observed in the entire cohort. Among the different centres the lowest

uptake rate of vaccination was 72.7% with 4 centres achieving 100% vaccination rates. The Covid infectivity rate varied between 0% – 15.6% among the 20 centres included in the study. (Fig 1) The reasons reported for not getting vaccinated among HCWs included pregnancy, recent childbirth, lactating, presence of other medical conditions, and concerns over safety of the vaccines.

DISCUSSION

The main findings of our study were that 90% of the healthcare workers accepted to be vaccinated and the rate of COVID infection in those who had completed 2 dosages of vaccination was lower than unvaccinated healthcare workers.

The uptake of vaccination among HCW has been a major concern as one out of five HCWs expressed hesitancy over the uptake of COVID-19 vaccines.³ In our study, several strategies were employed to allay fears and improve uptake. Clinicians, role models, institution heads and senior doctors all came forward initially to get vaccinated at the respective institutions. Photo booths were created where everyone getting vaccinated was encouraged to get themselves photographed and use it as their display profile in different social media platforms. This seemed to reassure the other HCWs and may have played an important role in the high uptake seen in all these institutions. Despite a lower infection rate for the immunized HCWs our study did not show a difference in hospital admission rates. It is likely that the HCWs preferred to isolate and self-monitor themselves at home and only presented for hospital admission when they were clinically worse. Moreover, a younger study population with absence of significant co-morbidity in either arm is a more likely explanation for this lack of difference in hospital admissions and mortality.

The infection rate in the un-immunized healthcare workers was significantly higher compared to those who had been completely immunized. This should be an important impetus for HCWs as well

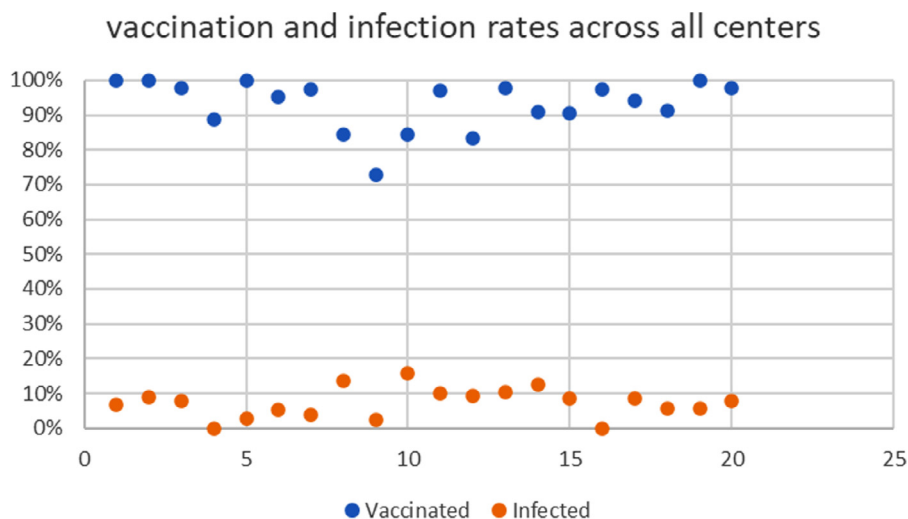


Fig 1. Vaccination uptake and incidence of COVID-19 infection across different centres.

as the general population to get vaccinated. It has also been shown that the viral load in vaccinated patients is much lower compared to those who are not vaccinated.⁶ This is of paramount importance because the viral load has been identified as a key driver of transmission. Another factor that has a role in preventing transmission is the herd immunity of around 70%.⁷ Thus, health care facilities should aim for a very high fully immunized workforce to create a local environment where herd immunity comes into play and prevents transmission to patients admitted for non-covid ailments. As non-covid clinical workload increases, higher the number of immunized HCWs, the less would be the theoretical risk of transmission to the patients.

Limitations

Only HCWs presenting with symptoms were tested with RT-PCR. It is therefore likely that asymptomatic infections were missed in our study. Also, seroconversion after vaccination was not confirmed in the entire population and may be an important confounder. We also did not collect important parameters like degree of severity, oxygen saturation levels, lab data (CRP, Ferritin, D-dimer, IL-6) or the severity of CT scores in all cases which would be useful to explain the impact on outcomes.

CONCLUSION

The uptake of vaccination among healthcare workers in our study was high and provided significant protection. Steps should be taken to encourage vaccination of all healthcare workers.

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