

The Impact of SARS-COV-2 Variants on Vaccine Efficacy Amongst Healthcare Workers During India's Second Wave

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Abstract

Despite a growing sense of normalcy in many Western nations, another wave of the COVID-19 pandemic has spread rapidly through the Indian subcontinent.

To improve our understanding of the crisis in India and the impact it is having on healthcare workers, we administered an electronic poll to healthcare workers in India.

A total of 199 healthcare workers responded to the survey, the majority of whom were physicians. Of all respondents, 177 had received at least one dose of a COVID-19 vaccine. Of those vaccinated, 14 respondents (7.9%) received the Covaxin® (Bharat Biotech) vaccine, while the remaining 163 respondents (92.1%) received the Covishield® (Oxford-AstraZeneca) vaccine. Of the 177 respondents who received a dose of a COVID-19 vaccine, 76 (43%) acquired COVID-19 after vaccination, of which 88% had symptomatic infections.

The protection offered by vaccination against new strains of SARS-CoV2 is a central question to which there remains an unclear answer.

No external sources of funding were used.

Background:

Despite a growing sense of normalcy in many Western nations, another wave of the COVID-19 pandemic has spread rapidly through the Indian subcontinent. The path and level of destruction of this latest wave of the COVID-19 pandemic in this region has been unprecedented, with more than 26 million confirmed cases and more than 291,000 deaths as of May 21st¹. Relatively low vaccination numbers compounded with the emergence of variants of SARS-COV-2, such as B.1.1.7 and B.1.617, have been the initial suspected etiologies for the devastation caused by this wave of the pandemic². Determining relationships between vaccination status, severity of infection, and incidence of infection has become of the utmost importance in understanding and strategizing responses to this resurgence of disease, both locally and globally. Thus, the objective of this study was to determine the interplay between vaccination and disease incidence and severity in Indian healthcare workers.

Methods:

To improve our understanding of the crisis in India and the impact it is having on healthcare workers, we administered an electronic poll to healthcare workers in India. Healthcare workers were polled via “Google Surveys” on a voluntary basis. Respondents were contacted via social media outlets, including Facebook and Twitter.

Findings:

A total of 199 healthcare workers responded to the survey, the majority of whom were physicians. Of all respondents, 177 had received at least one dose of a COVID-19 vaccine. Of those vaccinated, 14 respondents (7.9%) received the Covaxin® (Bharat Biotech) vaccine, while the remaining 163 respondents (92.1%) received the Covishield® (Oxford-AstraZeneca) vaccine. Of all respondents, 23 (13%) reported SARS-CoV2 infection prior to receiving their first dose of either vaccine.

Of the 177 respondents who received a dose of a COVID-19 vaccine, 76 (43%) acquired COVID-19 after vaccination. Of those who received the Covaxin® vaccine, 7 of the 14 respondents (50%) acquired COVID-19, while 69 of the 163 respondents (42%) who received the Covishield® vaccine acquired COVID-19. Of all those who acquired COVID-19 after vaccination, 25 (33%) reported testing positive within 2 weeks of vaccination, 29 (38%) reported testing positive 2 weeks to 1 month after vaccination, and 23 (30%) reported testing positive greater than 1 month after vaccination.

Reported severity of illness varied in survey respondents. Amongst those who tested positive after vaccination, 9 respondents (12%) had asymptomatic infections, while 67 respondents (88%) had symptomatic infections ranging from illness not requiring hospitalization (55 respondents, 72%), to non-ICU admission (11 respondents, 14%), to ICU admission (10 respondents, 13%).

Interpretation:

This voluntary survey of healthcare workers in India found a 43% rate of reported SARS-CoV2 infection following vaccination. This relatively high rate of reported infection was further reported as predominantly symptomatic COVID19 disease. Of patients with symptomatic disease, 28% required non-ICU hospital admission and 13.2% required ICU admission.

Understanding relationships between emerging variants and vaccination status has become paramount in our understanding of this new wave of the pandemic and its global implications. Given this scarcity of available information, any early sense of impact of this new wave of the pandemic on vaccinated patients is crucial to our understanding of the development of this pandemic. As such, this study aimed to provide an initial glimpse into the experience of healthcare workers in India who are currently confronting this staggering new wave of the COVID19 pandemic.

The protection offered by vaccination against new strains of SARS-CoV2 is a central question to which there remains an unclear answer. It has become clear that SARS-COV-2 variants, such as B.1.617, are spreading rapidly in India and are the predominant strains responsible for much of the morbidity and mortality associated with this latest wave. Several *in vitro* studies have suggested neutralizing potential of these vaccines against new variants³. Unfortunately, there have been little to no *in vivo* studies that have examined clinical vaccine efficacy in these new environments. The results from this survey suggest that, *in vivo*, vaccine efficacy to prevent both asymptomatic and symptomatic SARS-CoV2 infection may be significantly reduced. Notably, there was a significant proportion of patients who reported only mild symptomatic disease, indicating there may be a role in mitigating severe disease. The intrinsic and

extrinsic factors that may be responsible for this reduction in efficacy require further study. Additionally, the focus on healthcare workers in this study may aid in understanding a subpopulation with the highest exposure risk. Vaccine efficacy data obtained via clinical trials involving the general population may not be representative of vaccine efficacy in this subgroup.

There are several limitations to this study inherent to voluntary survey response studies. Respondents who had infection or had more severe infection may be more inclined to respond, leading to selection bias. Additionally, recall bias in recounting severity of illness may lead to overstatement of the severity of illness. This study did not include factors such as geographic location, immunocompetent vs immunocompromised status, comorbidities, and several other factors. This study also did not include members of the general population, which may limit generalizability. Regardless of these limitations, this study offers an initial glimpse into the impact of this new wave of the COVID19 pandemic on vaccinated healthcare workers in the Indian subcontinent.

In summary, this survey of healthcare workers in the Indian subcontinent reported high rates of both symptomatic and asymptomatic disease despite reporting receiving vaccination. Despite this higher rate of disease, most respondents only reported mild disease. The destruction produced from this latest wave of the COVID19 pandemic may be a call to the international community to unite to not only aid India, but to understand these variants and prepare for their potential spread. As the pandemic rages forward, systematic, and focused *in vivo* studies into vaccination efficacy to further confirm the effects found in this initial survey are necessary.

Declarations

1) The study was a electronic survey form created by me on Google Docs and distributed to Healthcare Workers in India through Social Media. The participation was entirely voluntary and identities of the respondents were entirely confidential. No patient identifier was there in the survey. We also put a disclaimer on the form about the Confidentiality. Hence we did not feel it necessary to get approval from Ethics committee for the survey

2) Response from the Participant in the survey was implied consent as the survey was entirely voluntary

3) We as authors of the study declare that we have no competing interest and have no financial or other interests that would affect the study. We do not have any Conflicts of Interests to declare"

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