

# COVID-19 transmission among vaccinated laboratory workers during the second wave in eastern Uttar Pradesh, India

Dear Sir,

We read with interest the article by Kaur et al.<sup>1</sup> those authors have reported a high proportion (27%) of severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) infections among ChAdOx1 nCoV-19 (AZD1222/Covishield) vaccinated participants (healthcare workers and elderly non-healthcare general public) during coronavirus disease (COVID-19) second wave. The study highlights that the protection observed in clinical trial settings may not be as high in real-world settings, especially during an ongoing wave of the pandemic. The study links the higher occurrence of SARS-CoV2 infection with the higher rate of Delta variant in Varanasi city of Uttar Pradesh in April 2021. However, the study also emphasizes the fact that the occurrence of “severe” COVID-19 was 7.7 times lower in fully vaccinated compared to partially vaccinated participants.<sup>1</sup>

Based on the findings of Kaur et al., we would like to share experiences from our center, Indian Council of Medical Research-Regional Medical Research Centre Gorakhpur (ICMR-RMRC Gorakhpur) at Gorakhpur, a city near Varanasi in Uttar Pradesh, India during the same timeline (April 2021). The center is functioning as one of the nodal centers for COVID-19 testing in the region of eastern Uttar Pradesh, India. It was on April 8, 2021, when India witnessed the second wave of COVID-19 due to the Delta variant,<sup>2</sup> we received a message from a laboratory official in the group stating that “I have been tested positive for COVID-19; all the staff should get tested!” The official was in contact with almost all of the staff working in the laboratory which was one of the COVID-19 testing centers, which created a fearful situation. But, somewhat we were all consoled by the fact that we all have had received at least one dose of COVID-19 vaccine shot of ChAdOx1 nCoV-19 (correspondingly in Kaur et al., 41% had received a single shot and 19% had received both shots of vaccine) in view of the initiatives taken up by the Government of India.<sup>3</sup> The very next day, all the asymptomatic staff members ( $n = 81$ ) were tested for COVID-19 and the results were alarming for all (1/4 of the tested samples [25%] turned out to be positive; 20 out of 81), after which screening was done for all the family members. The mean age of all COVID-19-positive cases was  $39.76 \pm 8.67$  years (range: 32–58 years). The median duration between the day of positivity and the day of the second dose of COVID-19 vaccine was 25 days (range: 24–47 days) and similarly in the partially vaccinated group was 29.5 days (range: 24–63 days). The timelines of vaccination and RT-PCR results are summarized in Table 1.

The high  $C_t$  values ( $\leq 30$  cycles) of RT-PCR results indicate that, if fully vaccinated individuals do become infected, the viruses can multiply in nasal mucosa a primary entry site for respiratory viruses, as efficiently as seen in the unvaccinated case.<sup>4,5</sup> The cases with an asterisk (\*) mark in Table 1, highlight that at least one of the family members were also infected with COVID-19. Although, a direct role in the transmission of infections to their family members could not be established, however, studies have shown that high viral load in vaccinated individuals may play a role in the transmission of the virus in community and also household settings.<sup>4</sup> Studies have shown that vaccination helps in clearing the viruses efficiently (decline rates 3 days mean duration).<sup>4</sup> Similar findings were noted in our cases; most of the vaccinated positive staff turned out negative after 10 days of home isolation except for one case (Case no. 21). Whereas in the unvaccinated case (Case no. 1), the virus was detectable even after 15 days of home isolation. Hence, breaking home isolation even after 10 days without going for RT-PCR detection might have proven to be of risk for the community. The two staff members (Case no. 6 and Case no. 18), who were completely or partially immunized (Table 1) still succumbed to unspecified post-COVID-19 complications. It indicates that the vaccine does not give 100% safety in terms of reinfection and hospitalization to all the individuals in a similar manner.<sup>1</sup> The five staff marked with a dollar sign (\$) were found positive again with the COVID-19 virus in the third wave (combination of Omicron and Delta variants)<sup>5</sup> and turned out negative after 1 week. In our study, we were unable to determine the variants of SARS-CoV2 in our infected cases due to crisis. However, the association with the Delta variant may be extrapolated taking into account the time period (April 2021) when the entire country was witnessing the Delta variant surge.<sup>6,7</sup>

As on March 17, 2022, India has vaccinated around 76% of its adult population. Hence, even after full vaccination, one must follow the COVID-19 appropriate behavior such as wearing masks, sanitizing hands regularly, and maintaining social distance whenever in the community.

## AUTHOR CONTRIBUTIONS

*Conceptualization:* Niraj Kumar, Brij R. Misra, Kamran Zaman, and Rajni Kant. *Data collection:* Niraj Kumar and Brij R. Misra. *Formal analysis:* Niraj Kumar, Brij R. Misra, Mahendra M. Reddy, Hirawati Deval, Kamran Zaman, and Rajni Kant. *Writing-original draft:* Niraj Kumar, Brij R. Misra, Mahendra M. Reddy, and Hirawati Deval.

**TABLE 1** Details of COVID-19 vaccination and outcomes among COVID-19-positive laboratory workers during second wave (n = 21).

Cases	Age in years	COVID-19 vaccination first dose	COVID-19 vaccination second dose	Date of COVID-19 positivity	Duration between COVID positivity & COVID vaccination (1st/2nd dose) in days	C <sub>t</sub> value ORF ab1	C <sub>t</sub> value N gene	Outcome
Case 1* <sup>§</sup>	32	Unvaccinated		08-04-2021	-	17.6	13.8	Recovered
Case 2* <sup>§</sup>	40	05-02-2021	16-03-2021	09-04-2021	24	20.14	19.02	Recovered
Case 3 <sup>§</sup>	40	05-02-2021	16-03-2021	09-04-2021	24	13.89	12.86	Recovered
Case 4	35	27-01-2021	25-02-2021	09-04-2021	43	22.6	23.04	Recovered
Case 5*	43	05-02-2021	12-03-2021	09-04-2021	28	13.35	12.17	Recovered
Case 6*	52	05-02-2021	15-03-2021	09-04-2021	25	27.28	28.29	Expired after 18 days
Case 7	35	05-02-2021	18-03-2021	09-04-2021	22	33.3	31.28	Recovered
Case 8*	40	15-03-2021	-	09-04-2021	25	20.67	21.6	Recovered
Case 9	35	05-02-2021	15-03-2021	09-04-2021	25	21.12	17.61	Recovered
Case 10	33	15-03-2021	-	09-04-2021	25	21.56	23.27	Recovered
Case 11	32	05-02-2021	-	09-04-2021	63	32.7	30.34	Recovered
Case 12	28	05-02-2021	15-03-2021	09-04-2021	25	25.62	22.9	Recovered
Case 13	58	16-03-2021	-	09-04-2021	24	32.43	31.66	Recovered
Case 14 <sup>§</sup>	26	05-02-2021	19-03-2021	11-04-2021	23	23.23	23.8	Recovered
Case 15	40	29-01-2021	26-02-2021	13-04-2021	46	18	19	Recovered
Case 16 <sup>§</sup>	38	09-03-2021	-	14-04-2021	36	22.42	24.52	Recovered
Case 17*	56	05-02-2021	05-03-2021	14-04-2021	40	26.39	29.29	Recovered
Case 18*	55	13-03-2021	-	16-04-2021	34	24	25	Expired after 5 days
Case 19	42	05-02-2021	18-03-2021	23-04-2021	36	28	29	Recovered
Case 20	35	05-02-2021	15-03-2021	30-04-2021	46	24.27	27	Recovered
Case 21 <sup>§</sup>	40	05-02-2021	15-03-2021	01-05-2021	47	16.22	17.84	Recovered

Abbreviations: COVID-19, coronavirus disease; C<sub>t</sub>, cycle threshold.

\*At least one of the family members was infected with the SARS-CoV-2 virus.

<sup>§</sup>Positive for COVID-19 in the third wave.

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#### CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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**REFERENCES**

1. Kaur U, Bala S, Ojha B, Jaiswal S, Kansal S, Chakrabarti SS. Occurrence of COVID-19 in priority groups receiving ChAdOx1 nCoV-19 coronavirus vaccine (recombinant): a preliminary analysis from north India. *J Med Virol*. 2022;94:407-412.
2. Deval H, Nyayanit DA, Mishra SK, et al. Genome sequencing reveals a mixed picture of SARS-CoV-2 variant of concern circulation in Eastern Uttar Pradesh, India. *Front Med (Lausanne)*. 2021;8:781287.
3. Kumar VM, Pandit-Perumal SR, Trkht I, Thyagarajan SP. Strategy for COVID-19 vaccination in India: the country with the second highest population and number of cases. *NPJ Vaccines*. 2021;6:60. doi:10.1038/s41541-021-00327-2
4. Singanayagam A, Hakki S, Dunning J, et al. Community transmission and viral load kinetics of the SARS-CoV-2 delta (B.1.617.2) variant in vaccinated and unvaccinated individuals in the UK: a prospective, longitudinal, cohort study. *Lancet Infect Dis*. 2022;22(2):183-195.
5. Mohapatra RK, Tiwari R, Sarangi AK, et al. Twin combination of Omicron and Delta variants triggering a tsunami wave of ever high surges in COVID-19 cases: a challenging global threat with a special focus on the Indian subcontinent. *J Med Virol*. 2022;94:1761-1765. doi:10.1002/jmv.27585
6. Indian SARS-CoV-2 Genomics Consortium (INSACOG). State-wise VOCs. 2021. Accessed March 17, 2022. <https://documentcloud.adobe.com/33377f5c-2dca-40cb-b153-ac2e9ed963cd>
7. Sadam R. Delta variant behind India's 2nd wave, 7 strains circulating in & around Varanasi, study finds. 2021. Accessed March 17, 2022. <https://theprint.in/health/delta-variant-behind-indias-2ndwave-7-strains-circulating-in-around-varanasi-study-finds/672288/>