Brief Communication

Severe acute respiratory syndrome coronavirus-2 IgG antibody response to coronavirus disease 2019 vaccination in South Indian health-care professionals with and without coronavirus disease 2019 exposure

INTRODUCTION

Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has spread globally in successive waves. Right from the time of the emergence of the pandemic in China, efforts were initiated to develop a vaccine against COVID-19. Serological tests detecting the presence of antibodies to various components of SARS-CoV-2 have been widely used as a surrogate marker of responsiveness to vaccination and detection of prior infection in vaccine-naïve individuals. In this study, we aim to assess SARS-CoV-2 antibody responses induced by the COVID-19 vaccine in health-care professionals (HCPs) at 30, 60, 90 days post vaccination and compare the responses between HCPs who had been previously naturally infected with COVID-19 and those who have not been infected.

METHODOLOGY

A total of 99 HCPs were recruited from a tertiary center for diabetes care in Chennai, South India. Participants were enrolled consecutively at the time of administration of first dose of COVID vaccine (ChAdOx1nCoV-19-Covishield). The second dose vaccine was taken at six weeks, i.e., 42 ± 4 days after first dose. Antibody measurements were repeated on days 30, 60, and 90 after the first dose of vaccination. The SARS-CoV-2 IgG antibody assay was performed by CLIA method using Siemens ADVIA Centaur® XPT analyzer (Siemens-Healthcare Diagnostics Inc., Tarrytown, NY, USA). Informed consent was obtained from all the participants.

The study participants were divided into two subgroups:

- Group 1: Naïve individuals: No previous infection with negative SARS-CoV-2 IgG test at baseline
- Group 2: Seropositive individuals: Previously exposed as confirmed by positive SARS-CoV-2 IgG test at baseline.

Statistical analyses were performed using GraphPad Prism 9.

RESULTS

Of the 99 HCPs enrolled, 49 (49.5%) were males and the rest were females. There were 68 and 31 HCPS in Group 1 and Group 2, respectively. The age ranged from 22 to 60 years (median – 40 [28.5–47.0]) and 22 to 56 years (median – 39 [31.7–39.0]) for Group 1 and Group 2, respectively. The seropositivity status 90 days after the first vaccination was observed to be 82% for Group 1 and 100% for Group 2. In both subgroups, the antibody levels were significantly higher at 30, 60, and 90 days compared to baseline ($P < 0.05$). At all time periods except on day 90, individuals in Group 2 had significantly higher antibody levels compared to those in Group 1 ($P < 0.05$). The peak antibody levels were noted in Group 2 at 30 days compared to Group 1 where the peak was observed at 60 and 90 days. In Group 2, the antibody levels at 30 days after the first dose were comparable to or exceeded the levels found in Group 1 after two doses of vaccination but did not significantly increase further following the second dose. Analyzing by sex, antibody level at 90 days was higher in females in Group 1 compared with males. In Group 2, there were no differences between males and females.

DISCUSSION

The development of effective vaccines within a year of the emergence of the COVID-19 pandemic represents an unprecedented scientific achievement. Vaccine-induced seroconversion occurs in the vast majority of infection-naïve individuals and also leads to increase in antibody levels in those previously exposed to SARS-CoV-2. We find that the antibody response peaked earlier and reached higher levels in individuals who were seropositive at baseline, showing the ability of the humoral immune system in these individuals to respond more promptly to a second exposure. A similar observation was found in a study conducted on health-care

workers by Buonfrate *et al*.[1] Krammer *et al*.[2] reported that individuals previously infected with COVID-19 had 45-fold higher antibody levels after vaccination compared to naïve individuals. However, it is not clear whether those previously infected would be able to mount a sufficient robust immune response to subsequent exposures, it is advisable for everyone (including those who have recovered from COVID) to receive a complete series of vaccination.

We also show that female participants demonstrated a higher and more durable antibody response compared to males, in both categories of HCPs studied. Efficacy of immunization status as well as severity, risk of hospitalization and deaths have been shown to vary with gender.[3]

The strength of this study is that serial systematic measurements of antibody done in the same HCPs who are in the highest risk group of exposure. The small sample size is a limitation of our study. We have also studied only one vaccine (Covishield); hence, our results may not to be generalizable to other vaccines.

Acknowledgments

We thank Siemens-Healthineers for supplying the antibody kits.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Ramamoorthy Jayashri, Kaliyaperumal Velmurugan, Chakrapani Jayanthi, Ranjit Mohan Anjana, Ranjit Unnikrishnan, Viswanathan Mohan

Dr. Mohan's Diabetes Specialities Centre and Madras Diabetes Research Foundation, Chennai, Tamil Nadu, India

Address for correspondence: Dr. Viswanathan Mohan, Dr. Mohan's Diabetes Specialities Centre, Madras Diabetes Research Foundation, No. 6, Conran Smith Road, Gopalapuram, Chennai - 600 086, Tamil Nadu, India.
E-mail: drmohans@diabetes.ind.in

REFERENCES

1. Buonfrate D, Piubelli C, Gobbi F, Martini D, Bertoli G, Ursini T, *et al*. Antibody response induced by the BNT162b2 mRNA COVID-19 vaccine in a cohort of health-care workers, with or without prior SARS-CoV-2 infection: A prospective study. Clin Microbiol Infect 2021;27:1845-50.
2. Krammer F, Srivastava K, Alshammary H, Amoako AA, Awawda MH, Beach KF, *et al*. Antibody responses in seropositive persons after a single dose of SARS-CoV-2 mRNA Vaccine. N Engl J Med 2021;384:1372-4.
3. Zeng F, Dai C, Cai P, Wang J, Xu L, Li J, *et al*. A comparison study of SARS-CoV-2 IgG antibody between male and female COVID-19 patients: A possible reason underlying different outcome between sex. J Med Virol 2020;92:2050-4.

Access this article online	
Quick Response Code:	Website: www.picronline.org
	DOI: 10.4103/picr.picr_62_22

How to cite this article: Jayashri R, Velmurugan K, Jayanthi C, Anjana RM, Unnikrishnan R, Mohan V. Severe acute respiratory syndrome coronavirus-2 IgG antibody response to coronavirus disease 2019 vaccination in South Indian health-care professionals with and without coronavirus disease 2019 exposure. Perspect Clin Res 2022;13:174-5.

Received: 09-03-22, **Accepted:** 24-03-22, **Published:** 30-06-22.