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JAMDA 23 (2022) 1114–1118

JAMDA

journal homepage: www.jamda.com

Research Letters

A Third Dose of mRNA COVID-19 Vaccine Significantly Enhances Anti–SARS-CoV-2 Spike IgG Response in Nursing Home Residents in Italy On behalf of the GeroCovid Vax Study Group*

To the Editor:

A rapid development of effective vaccines against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and their deployment has proved to be a highly successful strategy to reduce the impact of the COVID-19 pandemic.[1] Several studies have suggested a waning of humoral responses after primary vaccination.[2–4] A third dose of the mRNA vaccine was shown to increase neutralizing antibody levels and prevent severe outcomes.[5,6] However, data on the response to third dose of SARS-CoV-2 vaccine in the frail and complex population in Nursing Homes (NHs) are still limited. In this context, we have assessed the trajectories of humoral immunity in a sample NH resident receiving a 3-dose SARS-CoV-2 vaccine schedule.

Data are from the GeroCOVID VAX project, a study promoted by the Italian Society of Gerontology and Geriatrics (SIGG) and the Italian National Institute of Health (Istituto Superiore di Sanità) and sponsored by the Italian Medicines Agency (AIFA).[7] We present data based on a subsample of 144 residents with no clinical history of SARS-CoV-2 infection from 14 NHs in the Calabria Region of Italy. All participants received 2 doses of BNT162b2 vaccine 3 weeks apart and a third dose of an mRNA vaccine (either mRNA-1273 or BNT162b2) between 6 and 9 months from the first vaccine dose.[7] Humoral immunity was assessed by the Liaison SARS-CoV-2 TrimericS IgG assay (DiaSorin, Italy) on serum samples collected at 4 time points: prior to the first dose of vaccine (T0); 2 months after first vaccine dose (T1); 6 months after first vaccine dose (T2); and 2 months after third dose (T3). T2 assessment was always performed before the third dose. IgG antibody concentrations were expressed as binding antibody units (BAU/mL). According to manufacturer's instructions, values $\geq$33.8 BAU/mL were interpreted as positive. Given the nonnormal distribution of SARS-CoV-2 TrimericS IgG antibody concentrations, statistical analyses were performed using log-transformed values and geometric means (GMs) were calculated. Analysis of variance was used to compare the GM across the 4 time points. T1 was used as the reference group. Differences in GM at T3 were tested across sex, age groups, and time from first vaccination.

The study was approved by the Italian National Ethical Committee with the permission number 264/2021 (January 26, 2021).

Median age of 144 study participants was 85.2 years and 104 (72.2%) were female. Participants were vaccinated with 2 doses of BNT162b2. A third vaccination was administered with BNT162b2 (n=130) or mRNA-1273 (n=14) between 6 and 9 months after the first dose. The rate of participants with anti–TrimericS IgG levels above the positivity cutoff of the serologic test raised from 0% at T0 (prior to first dose) to 99% at T1 (1 month after second dose) and then declined to 81% at T2 (5 months after the second dose). At T3, 2 months after the third dose all participants (100%) exceeded the positivity threshold. As shown in Table 1, SARS-CoV-2 TrimericS IgG concentration at T1 was significantly higher than those observed at T0 and T2, but significantly lower than that measured at T3. A similar trend was observed in men and women and in both age groups considered. When GM differences were tested across sex and age groups for T3, we observed that participants aged <80 years had higher antibody levels as compared with those aged $\geq$80 years (GM = 4832.0 vs 3272.8 BAU/mL), but this association did not reach statistical significance ($P = .08$). No substantial difference was observed according to sex. Among participants receiving the third dose 8-9 months after first dose (n=114), GM at T3 was higher (3775.2 BAU/mL; SE = 400.9) as compared with those receiving third dose 6-7 months after first dose (n=30) (2996.7 BAU/mL; SE = 620.4), although not significant ($P = .32$).

The present study shows that among NH residents in Italy without prior SARS-CoV-2 infection, a third dose of mRNA SARS-CoV-2 vaccines significantly enhances the antibody response to the Spike protein, even in those residents >80 years of age. Therefore, we confirm and reinforce findings of a previous study suggesting a strong and rapid decay of humoral immunity after the second BNT162b2 dose and a high antibody response after the third dose.[5] Moreover, our data show that an extended interval between the first and the third dose did not result in impaired immunogenicity, thus adding relevant information for the implementation of timely administered booster vaccinations among frail, older people who often present with an inadequate immune response. These real-world data are valuable for shaping ongoing and future vaccination campaigns.

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Giorgio Fedele and Annapina Palmieri equally contributed to this work.

Funding: The GeroCovid Vax Study was funded by a grant from the Italian Medicines Agency (Agenzia Italiana del Farmaco, AIFA–resolution no. 14, February 4, 2022).

The authors declare no conflicts of interest.

* List of GeroCovid Vax Study Group members is available in reference 7.

Table 1
Geometric Means (GMs) and SEs of SARS-CoV-2 TrimericS IgG Serum Concentration at Baseline Assessment (Prior to Vaccination, T0), 2 and 6 Months After First Dose (T1 and T2), and 2 Months After Third Dose (T3) in Nursing Home Residents

	SARS-CoV-2 TrimericS IgG Serum Concentration, BAU/mL											
	T0: Prior to Vaccination			T1: 2 mo After First Dose			T2: 6 mo After First Dose			T3: 2 mo After Third Dose		
	GM	SE	*P* Value	GM	SE	*P* Value	GM	SE	*P* Value	GM	SE	*P* Value
Whole sample (n=144)	4.9	0.1	<.001	833.7	89.8	Ref.	92.0	8.7	<.001	3597.9	339.5	<.001
Sex												
Women (n=104)	5.0	0.1	<.001	812.0	103.3	Ref.	98.3	11.9	<.001	3690.6	663.9	<.001
Men (n=40)	4.8	0.1	<.001	892.7	183.0	Ref.	95.3	18.5	<.001	3562.9	397.5	<.001
Age group												
<80 y (n=35)	4.8	0.14	<.001	1176.1	255.0	Ref.	124.8	23.9	<.001	4832.0	919.1	<.001
≥80 y (n=109)	5.0	0.08	<.001	746.4	91.7	Ref.	83.4	9.0	<.001	3272.8	352.7	<.001

Ref., reference.
All participants received 2 doses of BNT162b2 vaccine 3 weeks apart and a third dose of an mRNA vaccine (mRNA-1273 or BNT162b2) between 6 and 9 months from the first vaccine dose. GMs were compared across the 4 time points (T1 is the reference).

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http://dx.doi.org/10.1016/j.jamda.2022.05.006

Administrator Turnover in Oregon Assisted Living and Residential Care Communities, March 2020–February 2021

The impact of the COVID-19 pandemic on residents and staff of assisted living and residential care (AL/RC) facilities has been sizable,[1] yet little is known about how the pandemic affected their administrators and their job stability.[2] Considering the crucial role that administrators play in the delivery of high-quality care and staffing in residential long-term settings,[3–6] this research letter describes the turnover experience among Oregon AL/RC administrators and its organizational and structural correlates during the first year of the COVID-19 pandemic (March 2020–February 2021).

Administrative records were retrieved from Oregon Department of Human Services (the licensing agency) for 549 AL/RC facilities licensed and operated during the study period (see Supplemental Material for details about AL/RC licensing in Oregon). The dependent variable was a community-level binary indicator that measured whether the administrator as of March 1, 2020, had left their position by February 28, 2021 (stayers = 0, leavers = 1). Organizational characteristics included in the analysis were the number of licensed beds, whether the AL/RC facility was endorsed for memory care (MC) (0 = non-MC, 1 = MC), whether the AL/RC facility had a contract to serve Medicaid residents (0 = non-Medicaid, 1 = Medicaid), nonprofit status (0 = for-profit, 1 = nonprofit), and the tenure of

The author declares no conflicts of interest.