DYNAMICS OF INACTIVATED SARS-COV-2 VACCINE ANTIBODY RESPONSE IN SARS-COV-2-SEROPOSITIVE AUTOIMMUNE RHEUMATIC DISEASE PATIENTS

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BACKGROUND

Limited information is available on response to COVID-19 vaccines in autoimmune rheumatic disease patients (ARD) previously exposed to the SARS-CoV-2. We compared the dynamics of vaccine induced antibody production after immunization with CoronaVac in SARS-CoV-2-seropositive ARD patients (ARD+) with two age/sex balanced groups: SARS-CoV-2-naïve ARD patients (NAÏVE-ARD) and SARS-CoV-2-seropositive control group (CTRL+).

METHODS

Participants of this phase 4 prospective controlled study (clinicaltrials.gov #NCT04754698) were vaccinated with two doses of CoronaVac (28-days interval). Primary objective was immunogenicity dynamics evaluated by median neutralizing activity (NAb-activity)/anti-SARS-Cov-2 In(IgG) titers[In(IgG)] from D0–D28 and from D28–D69. Secondary objectives included safety and other immunogenicity parameters.

RESULTS

Diseases and therapy were similar in ARD+ and NAÏVE-ARD groups ($p > 0.05$). Comparable dynamics were observed for ARD+ and CTRL+ with a plateau increase occurring from D0–D28 (ARD+, NAb-activity: 59.1 to 81.8%, mean difference –12.1%, $p = 0.002$ and anti-S1/S2-GMT: 52.3 to 128.9, In(IgG) mean difference –0.9, $p < 0.001$) and (CTRL+, NAb-activity: 57.5 to 91.9%, mean difference –25.2%, $p < 0.001$ and anti-S1/S2-GMT: 53.3 to 202.0, In(IgG) mean difference –1.33, $p < 0.001$). Insignificant increments occurred from D28–D69 for ARD+ and CTRL+ regarding NAb-activity ($p > 0.999$) and anti-S1/S2-GMT ($p < 0.999$). In contrast, a distinct pattern was observed for NAÏVE-ARD with negligible increase from D0–D28 (NAÏVE-ARD, NAb-activity: 15 vs. 15%, mean difference –8.3%, $p < 0.001$ and anti-S1/S2-GMT: 2.3 vs. 5.7, In(IgG) mean difference –0.93, $p < 0.001$) and a moderate increase from D28–D69 (NAÏVE-ARD, NAb-activity: 15.0 vs. 39.4%, mean difference –19.2%, $p < 0.001$ and anti-S1/S2 – GMT: 5.7 vs. 29.6, In(IgG) mean difference –1.65, $p < 0.001$) (Table 1, Figure 1). Supporting these findings, significant differences in NAb activity/In(IgG) anti-S1/S2-GMT were observed between ARD+ vs. NAÏVE-ARD at D0: 43.8%/3.14, $p < 0.001$, D28: 47.5%/3.12, $p < 0.001$ and D69: 29%/1.53, $p < 0.001$, whereas no difference occurred between ARD+ vs. CTRL+ at D0: –0.5%/–0.02, $p > 0.999$ and D69: –12.3%, $p = 0.167/0.32\%$, $p = 0.258$ with minor difference at D28: –13.6%, $p = 0.067/–0.45$, $p = 0.006$.

Table 1. Median percentage of neutralizing activity and anti-SARS-CoV-2 S1/S2 IgG titers before(D0) and after the first(D28) and second(D69) doses of Sinovac-CoronaVac vaccination in ARD+, NAïVE-ARD and CTRL+.

	ARD+ n =157	CTRL+ n =157	NAïVE -ARD n = 471	ARD+ n = 157	CTRL+ n = 157	NAïVE -ARD n = 471
D0	59.1 (38.8–82.5)	57.5 (41.2–79.1)	15.0 (15.0–15.0)	52.3 (42.9–63.9)	53.3 (45.4–62.5)	2.3 (2.2–2.3)
D28	81.8 (54.3–95.8)	91.9 (78.6–96.4)	15.0 (15.0–15.0)	128.9 (105.6–157.4)	202.0 (174.8–233.4)	5.7 (5.1–6.4)
D69	78.7 (57.4–94.1)	92.1 (74.6–96.3)	39.4 (15–64.8)	137.1 (116.2–161.9)	188.6 (167.4–212.6)	29.6 (26.4–33.3)
p (Groups)		< 0.001			< 0.001	
p (Timepoints)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
p (Interaction)		< 0.001			< 0.001

Figure 1.

CONCLUSION

ARD+ patients mount a robust plateau response after a single dose of inactivated SARS-CoV-2 vaccine, independent of preexisting ARD/therapy, whereas NAïVE-ARD patients require the second dose to ensure a moderate antibody production. Our findings raise the possibility of a single dose regimen in ARD patients previously exposed to SARS-CoV-2.

KEYWORDS

Autoimmune rheumatic diseases, COVID-19, Vaccine, Seropositive, Immunogenicity.