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Antibody Response Post-COVID-19 Vaccination in Patients With Chronic Myeloid Leukemia With Comparison Between Comirnaty and CoronaVac Vaccine

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Dear Editor

Chronic myeloid leukemia (CML) is a type of myeloproliferative neoplasm characterized by an oncogenic fusion gene, *BCR-ABL1*. Most CML patients present at chronic phase, ~90%,[1] when BCR-ABL1 tyrosine kinase inhibitor (TKI) is the recommended first-line treatment. Antibody response after severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) vaccination in CML patients is concerned due to probable CML-induced and/or TKI-induced immunosuppression. To our knowledge, two studies reported antibody response post-SARS-CoV-2 vaccine in CML patients.[2,3] A study reported anti-spike SARS-CoV-2 IgG (IgG-S) responses > 14 days after a dose of Comirnaty (Comirnaty or BNT162b2, Pfizer-BioNTech) (n = 1) or ChAdOx1 (ChAdOx1 nCoV-19 or AZD1222, AstraZeneca-Oxford) (n = 11) vaccine.[2] Seroconversion rate post-ChAdOx1 was lower than control group, 8/11 (73%) versus 58/63 (92%).[2] A study reported response 3 weeks after a dose of Comirnaty (n = 16) using a different laboratory methodology.[3]

As data are little and less so on CoronaVac (Sinovac) vaccine in CML patients, we conducted a longitudinal study on antibody progression post-SARS-CoV-2 vaccination in CML patients from southern Sarawak. We present the comparison of antibody response at W6 and W16 between Comirnaty and CoronaVac vaccine in the cohort.

Titer of IgG-S was determined prior to vaccination (W0) and at 3 (W3), 6 (W6), 16 (W16), 32 (W32), and 52 weeks (W52) in reference to the first dose of vaccination. The second dose of vaccine was the same vaccine type as the first dose and it was scheduled at 3 weeks after the first dose for both vaccines. Vaccines were under Malaysia vaccination program and generally type of vaccine was not decided by patients.

A total of 43 CML patients were enrolled from August 26, 2021, to November 30, 2021. Results presented were until December 9, 2021. At study entry, 23 (53%), 11 (26%), two (5%), one (2%), and two (5%) patients were on imatinib, nilotinib, dasatinib, bosutinib, and ponatinib, respectively; one (2%) patient on imatinib + peginterferon-α due to concomitant CML and essential thrombocythemia, and three (7%) patients were not on TKI as enrolled in *M*alaysia *S*top TK*I* *T*rial (MSIT).[4] Most of them had completed second dose of vaccine during study entry.

At W6, seroconversion rate postvaccination (IgG-S ≥ 50 AU/mL) was 42/43 (96.9%). The only nonseroconverted patient received ChAdOx1. Table 1 shows the comparison of IgG-S between Comirnaty and CoronaVac. After excluding patients with breakthrough COVID-19, median decline rate of IgG-S between W6 and W16 ([IgG-S W6 − IgG-S W16] / number of weeks between W6 and W16) was 165.2 (range = −155.8 to 334.0) and 67.8 (31.1 to 222.41) AU/mL/week for Comirnaty (n = 6) and CoronaVac (n =7),

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Table 1. Comparison of IgG-S Between Comirnaty and CoronaVac Vaccine in CML Patients.

Characteristics		W6			W16[a]		
		Comirnaty	CoronaVac	*P* value	Comirnaty	CoronaVac	*P* value
Before exclusion	n	9	21		15	23	
	Age, years	48.6 (17.3)	47.9 (13.4)	.912[b]	50.3 (14.2)	47.9 (13.1)	.603[b]
	M:F ratio	7:2	16:5	1.000	9:6	17:6	.481
	M:C:D ratio	2:5:2	8:6:7	.679	3:5:3	5:3:8	.336
	BMI, kg/m^2	26.1 (4.0)	26.8 (5.1)	.703[b]	24.9 (2.9)	28.1 (9.5)	.215[b]
	No. week[c]	9.6 (2.0)	9.4 (2.1)	.814[b]	16.7 (1.0)	17.4 (2.1)	.189[b]
	IgG-S, AU/mL[d]	4016 (4318.4)	2583.2 (7703.8)	.001[e]	4582.4 (8092.3)	10865.0 (15320.0)	.184[e]
	IgG-S negative, n (%)[d]	0 (0)	0 (0)	.003	0 (0)	1 (4.3)	.005
	IgG-S low, n (%)[d]	0 (0)	14 (66.7)		3 (20.0)	12 (52.2)	
	IgG-S medium, n (%)[d]	7 (77.8)	6 (28.6)		8 (53.3)	1 (4.3)	
	IgG-S high, n (%)[d]	2 (22.2)	1 (4.8)		4 (26.7)	9 (39.1)	
Excluded breakthrough COVID-19[f]	n	7	14		11	9	
	Age, years	52.6 (17.8)	47.4 (14.8)	.485[b]	53.8 (14.7)	42.7 (12.3)	.087[b]
	M:F ratio	5:2	10:4	1.000	7:4	6:3	1.000
	M:C:D ratio	2:3:2	6:3:5	.585	3:6:2	4:3:2	.621
	BMI, kg/m^2	26.1 (4.2)	27.1 (5.5)	.663[b]	24.7 (2.6)	27.2 (6.3)	.236[b]
	No. week[c]	10.1 (1.9)	9.4 (2.0)	.483[b]	16.6 (1.0)	16.8 (1.4)	.732[b]
	IgG-S, AU/mL[d]	2007.3 (947.8)	698.5 (700.7)	.001[e]	2237.0 (1782.0)	252.2 (223.0)	.005[e]
	IgG-S negative, n (%)[d]	0 (0)	0 (0)	.001	0 (0)	1 (11.1)	.011
	IgG-S low, n (%)[d]	0 (0)	11 (78.6)		3 (27.3)	8 (88.9)	
	IgG-S medium, n (%)[d]	7 (100)	3 (21.4)		6 (54.5)	0 (0)	
	IgG-S high, n (%)[d]	0 (0)	0 (0)		2 (18.2)	0 (0)	

Results are in mean (standard deviation) unless specified otherwise.

Abbreviations: BMI, body mass index; CML, chronic myeloid leukemia; M:C:D, Ethnicity Malay: Chinese:Dayak; M:F, gender male:female.

[a]At W16, only two patients who received CoronaVac vaccine had received third dose of vaccine, Pfizer vaccine, at 0.3 and 1.1 weeks prior to the blood sampling of W16. Their results are included in W16 analysis in view of the short interval between W16 and third dose of vaccine.

[b]Independent *t* test.

[c]Number of weeks between blood sampling and first dose of vaccine.

[d]The IgG-S was quantified as per manufacturer's protocol (Abbott Architect 1000SR CMIA method). Positive threshold was set at ≥50 AU/mL. Low (50-839 AU/mL), medium (840-3999 AU/mL), and high (≥4000 AU/mL) titer were based on the US Food and Drug Administration guidance[5] and the assay provider's threshold corresponding to a 0.95 probability of obtaining a plaque reduction neutralization test (PRNT) ID50 at a 1:250 dilution, respectively.

[e]Mann-Whitney *U* test (on median).

[f]Definition: positive serology definition (see below) or self-reported infection (nasopharyngeal swab RTK and/or PCR positivity) in previous or the tested time point. Serology definition uses anti-nucleocapsid IgG (IgG-N) and anti-spike IgM (IgM-S) tested for each blood sample, in which titer of ≥1.4 and ≥1.0, respectively, was determined as positive according to manufacturer's protocol. As acknowledging both vaccines induce IgM-S and CoronaVac induces IgG-N, we maintained the cutoff point for W0 but changed to IgG-N ≥ 1.4 or IgM-S ≥ 2.0 for Comirnaty and IgG-N ≥ 2.8 or IgM-S ≥ 2.0 for CoronaVac for the subsequent time points W3 to W16 based on our preliminary observation.

respectively ($P = .029$). Median of the percentage of decline rate (decline rate of IgG-S between W6 and W16 / IgG-S W6 × 100%) was 8.6%/week (−12.7% to 13.0%) and 9.2%/week (7.0% to 10.7%) for Comirnaty and CoronaVac, respectively ($P = 1.000$).

Our study showed high seroconversion rate postvaccination in CML patients despite TKI. Comirnaty induced higher mean IgG-S than CoronaVac—2007.3 (n = 7) versus 698.5 AU/mL (n = 14) ($P = .001$) at W6 and 2237.0 (n = 11) versus 252.2 AU/mL (n = 9) ($P = .005$) at W16—but similar percentage of IgG-S decline rate.

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Declaration of Conflicting Interests

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