https://doi.org/10.32394/pe.76.13

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LETTER TO THE EDITOR: COMPLEMENTARY DOSE OF COVID-19 VACCINATION MAY PREVENT SARS-COV-2 BREAKTHROUGH INFECTION AMONG PREVIOUSLY VACCINATED HIV POSITIVE PERSONS

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ABSTRACT

People living with HIV (PLWH) are a heterogeneous group of immunocompromised persons. Detectable HIV viral load and chronic comorbidities are independently increasing the risk of severe outcomes from COVID-19 among PLWH. We aimed to assess the efficacy and safety of the COVID-19 vaccines in PLWH. A significant increase in S-RBD antibody titers >100 AU/mL was observed when compared the titers measured one week after the 1st dose to titers performed after the 2nd vaccine dose.

Key words: *HIV, COVID-19, vaccination, prevention, viral infections*

Dear Editor,

People living with HIV (PLWH) are a heterogeneous group of immunocompromised persons. Nomah et al. presented that detectable HIV viral load and chronic comorbidities are independently increasing the risk of severe outcomes from COVID-19 among PLWH (1). Infected immunocompromised persons may host a rapid viral evolution due to the prolonged infection (2). For example, Trurong et al. showed evidence of ongoing replication and infectivity for up to 162 days from initial positive results, which were verified with positive subgenomic RNA, single-stranded RNA, and viral culture analysis. Moreover, they found accumulation of mutations, some with the potential for immune escape, from samples taken from immunocompromised individuals (3).

At the same time, it was shown that immune response to COVID-19 vaccine among HIV positive persons is similar to that of individuals without HIV infection, and that vaccines prove to be safe (4, 5). This underlines the importance of prompt and timely vaccination of HIV positive persons against SARS-CoV-2 infection (6). Nevertheless, until now many countries did not prioritize this group of patients in national vaccination strategies (7).

The national program of vaccination against COVID-19 in Poland started mid-December 2020, at that time no efficacy and safety data for PLWH were available. Therefore, we initiated a project to follow up on the HIV positive patients being under the routine care of HIV Outpatient Clinic in Warsaw and receiving COVID-19 vaccine (Bioethical Committee approval Nr AKBE/155/2021). The initial phase included 21 PLWH, mostly healthcare workers (16; 61.9%), male (18; 85.7%), with median age of 47 years (IQR: 39-49) and on effective cART (21/21, 100% had undetectable HIV viral load, and had median lymphocyte CD4+ count of 629 cells/uL [IQR: 519–764 cells/uL]). Vaccines used were: BNT162b2 vaccine (17; 80.9%), mRNA-1273 vaccine (3; 14.3%), and ChAdOx1 vaccine (1; 4.8%). Vaccine adverse effects (VAE) were more likely to occur after the 1st vaccine dose compared to patients after the 3rd dose (7/21, 33.3% vs. 1/17, 5.9%, p=0.0390). Majority of VAE were mild and self-resolving with mean duration of 1.64 days.

The titers of SARS-CoV-2 IgG antibodies (against the n-protein) and S-RBD antibodies (indicative of a response to vaccination) were measured using MAGLUMI SARS-CoV-2 IgG and MAGLUMI SARS-CoV-2 S-RBD IgG assays (chemiluminescent immunoassay).

In terms of serological response a statistically significant increase in proportion of individuals with S-RBD antibody titers >100 AU/mL was observed when comparing the titers measured one week after the 1st dose to titers performed after the 2nd vaccine dose (3/21, 14.3% vs. 17/21, 81.0%; p<0.0001) (Table 1). Finally, after 12 months of follow-up four (19%) patients had a breakthrough SARS-CoV-2 infection confirmed

Table 1. Baseline characteristics of HIV-positive patients vaccinated against COVID-19 with at least two doses of vaccine. Two patients were convalescents before first dose. Four patients (19.0%) had COVID-19 diagnosed by either RT PCR or antigen test.

	After 1st dose	After 2nd dose	After 3rd dose	P value
Confirmed SARS-CoV-2 infection	1 (4.8%)	1 (4.8%)	2 (9.5%)	–
Vaccine Adverse Event, n (%)	7 (33.3)	3 (14.3)	1 (4.8)	0.0458
Quantitative, median (IQR)				
IgM, median (IQR) AU/mL	0.54 [0.23-1.20]	1.15 [0.35-3.89]	-	0.1971
IgG in AU/mL	0.10 [0.06-0.22]	0.05 [0-0.25]	-	0.0232
S-RBD in AU/mL	8.15 [2.89-78.96]	100 [100-100]	-	0.0051
Qualitative, n (%)				
SARS-CoV-2 IgM (+)	5 (23.8)	10 (47.6)	-	0.1074
SARS-CoV-2 IgG (+)	2 (9.5)	3 (14.3)	-	0.6337
Anti S-RBD (+)	11 (52.4)	20 (95.2)	-	0.0016
S-RBD > 100 AU/mL	3 (14.3)	17 (81.0)	-	<0.0001

IQR - interquartile range; IgM - antibodies against the SARS-CoV-2 in IgM class; IgG - antibodies against the SARS-CoV-2 in IgG class; S-RBD - antibodies anti-Spike protein Receptor-binding domain. All tests were performed with MAGLUMI system, one week after receiving the respective vaccine dose.

either by RT PCR or antigen test. Half of them after the third dose of vaccination. However, none of them had symptoms or required hospitalization due to COVID-19.

Starting September 2021 HIV positive persons in Poland were recommended to receive third (complementary) dose of vaccination irrespective of planned boosters. This strategy seems a valid preventive method against SARS-CoV-2 infection.

DECLARATIONS

Conflict of interest.
The authors declare no conflict of interest.

Availability of data and material.
The data sets used and/or analyzed during the current study can be made available by the corresponding author on reasonable request.

Funding.
No funding was received.
All authors have read and approved the final article.

Acknowledgements.
Not applicable.

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Received: 06.07.2022
Accepted for publication: 28.07.2022
Otrzymano: 06.07.2022 r.
Zaakceptowano do publikacji: 28.07.2022 r.
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