Evolution of anti-SARS-CoV-2 spike protein titers after two-dose COVID-19 vaccination among people living with HIV

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Background

- A community COVID-19 outbreak caused by the B.1.1.7 SARS-CoV-2 variant occurred in Taiwan in May, 2021. High-risk populations such as people living with HIV (PLWH) were recommended to receive two doses of COVID-19 vaccines then.
- While SARS-CoV-2 vaccines have demonstrated promising results in general population, real-world information on the serological responses remains limited among PLWH.

Methods

- PLWH receiving two homologous SARS-CoV-2 vaccines from 2020 to 2021 were enrolled.
- Determinations of anti-SARS-CoV-2 spike IgG titers were performed every one to three months, until PLWH received the third dose of SARS-CoV-2 vaccine or had confirmed SARS-CoV-2 infection. All serum samples were tested for anti-nucleocapsid antibody and those tested positive were excluded from analysis.
- The primary end points were serologic responses at weeks 1-12 after the second dose of SARS-CoV-2 vaccination. In order to estimate the potential vaccine effectiveness through antibody measurements, a cut-off value of 141 BAU/mL of anti-spike IgG were used, which was considered to be correlated with the presence of neutralizing antibodies by Dimeglio C, et al..

Results

- A total of 1,253 participants were enrolled, including 829 (66.2%) receiving AZD1222 vaccine, 232 (18.5%) mRNA-1273 vaccine, 128 (10.2%) BNT162b2 vaccine and 64 (5.1%) MVC-COV1901 vaccine.
- Of all time periods, participants receiving mRNA-1273 vaccine consistently had higher antibody levels than those receiving non-mRNA vaccine ($p<0.001$ for all time-period comparisons) (Figure 1).
- Of all participants receiving two homologous vaccines, factors associated with failure to reach an anti-spike IgG titer >141 BAU/mL within 12 weeks were those receiving AZD1222 vaccine (adjusted odds ratio [aOR], 10.66; 95% CI, 7.08-16.06, those with mRNA-1273 vaccine as reference) and MVC-COV1901 vaccine (aOR, 9.21; 95% CI, 4.92-17.25, those with mRNA-1273 vaccine as reference).
- Of participants receiving two doses of AZD1222 vaccine, factors associated with failure to reach an anti-spike IgG titer >141 BAU/mL within 12 weeks included diabetes mellitus, chronic kidney disease (defined as eGFR<60 ml/min/1.73m2) and CD4 count <200 cells/mm3 upon the first dose of vaccination (Figure 2).

Conclusion

- Two doses of homologous mRNA vaccination had significantly higher immunogenicity than vaccination with AZD1222 or MVC-COV1901 among PLWH.
- PLWH with CD4 count <200 cells/mm3 had consistently lower antibody responses to vaccination with either mRNA or non-mRNA vaccines.

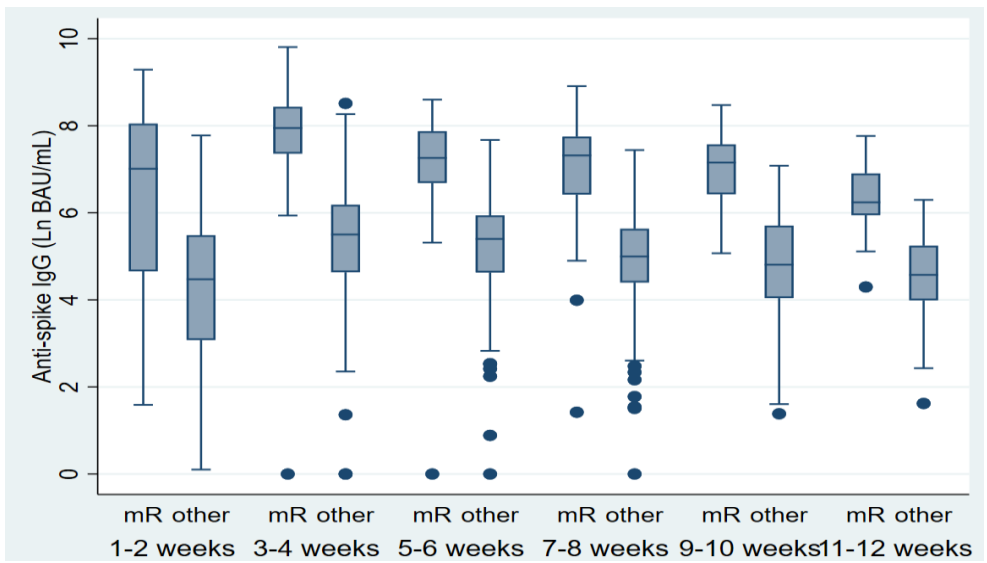

Figure 1. Serologic responses after the second dose of COVID-19 vaccination at different follow-up intervals (mRNA [mRNA-1273 and BNT162b2] vs others [AZD1222 and MVC-COV1901]).

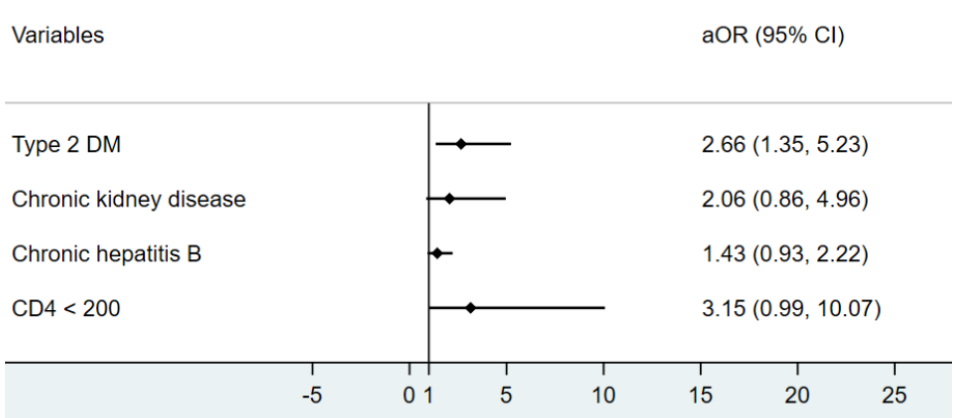

Figure 2. Risk associated with low anti-spike IgG response within the first 12 weeks after PLWH received two doses of AZD1222 vaccine in the multivariate logistic regression model.