

Immunogenicity of AZD1222 (ChAdOx1) SARS-CoV-2 vaccine in people living with HIV

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BACKGROUND

People living with HIV (PLWH) are at increased risk for severe COVID-19 [1]. We aimed to evaluate the serological response after two doses of AZD1222 (ChAdOx1) SARS-CoV-2 vaccination in PLWH.

MATERIALS AND METHODS

Participants were evaluated before the first dose (baseline) and 3 months after the second dose of the ChAdOx1 vaccine. Patient's sera were analyzed using the SARS-CoV-2 IgG II Quant Architect Abbott assay [2]. An antibody concentration ≥ 50 arbitrary units per milliliter (AU/ml) was defined as positive (seroconversion) [2]. We also compared the immunogenicity of AZD1222 in PLWH to sex-matched healthcare workers (controls) who received two doses of the BNT162b2 vaccine. The study measurements were done from April to December 2021.

Figure. Comparison of antibody levels (log transformed) 3-months after the second dose of AZD1222 (ChAdOx1) SARS-CoV-2 vaccine in people living with HIV (PLWH) and second dose of BNT162b2 vaccine in HIV-uninfected controls (A). Horizontal lines are the median, Q1 and Q3 values. Panel B: The distribution of antibody levels 3-months after the second dose of AZD1222 or BNT162b2 vaccine in 59 PLWH and 59 controls. The SARS-CoV-2 IgG II Quant Architect Abbot assay was used.

RESULTS

Fifty-nine PLWH were included: 57 men, median age 45.0 years, all receiving antiretroviral treatment and with controlled viral loads (58 with HIV RNA < 50 copies/ml), 57 had > 200 CD4+ cells/ μ l, and the median CD4 cell count was 722 (IQR, 520-878) cells/ μ l (Table). Eight (13.6%) PLWH were obese (≥ 30.0 kg/m²), and 31 (52.5%) were overweight (excluding obese). At baseline 56 PLWH had an antibody concentration < 50 AU/ml. Fifty-five (93.2%) patients seroconverted after vaccination. An antibody concentration between 50 and 1000 AU/ml had 36 (61.0%) PLWH, 18 (30.5%) had between 1000 and 40000 AU/ml and only one had above the upper threshold of quantification (Figure).

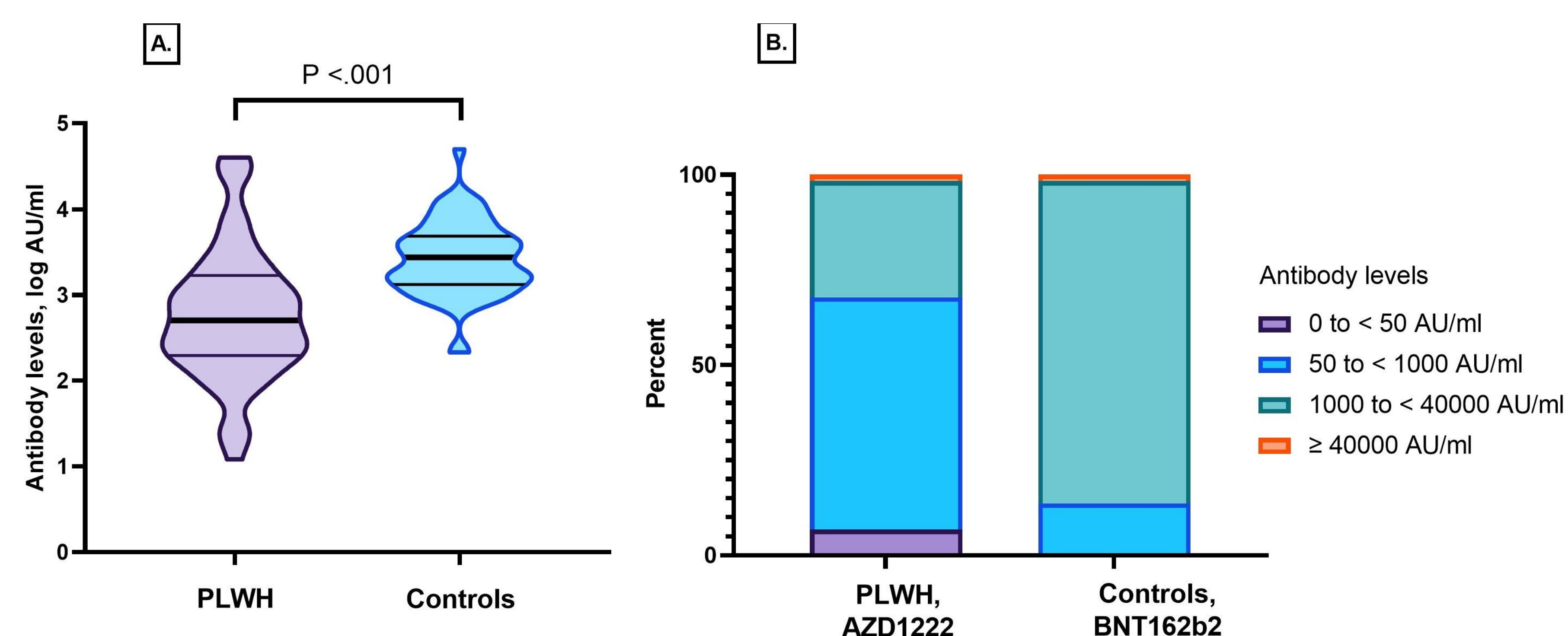


Table. Baseline characteristics of 59 PLWH and anti-SARS-CoV-2 IgG antibodies levels, 3-months after two doses of AZD1222 (ChAdOx1).

| | Antibody levels after 3 months | | Total (N = 59) | P Value |
|---|--------------------------------|-------------------------------|-----------------------|---------|
| | < 1000 AU/ml (N = 40) | ≥ 1000 AU/ml (N = 19) | | |
| Male gender | 38 (95.0) | 19 (100.0) | 57 (96.6) | $>.99$ |
| Age, years | 43.5 (38.7 – 52.2) | 46.2 (40.3 – 51.2) | 45.0 (39.0 – 51.6) | .73 |
| Age > 50 years | 14 (35.0) | 5 (26.3) | 19 (32.2) | .50 |
| Transmission | | | | |
| Heterosexual | 2 (5.0) | 1 (5.3) | 3 (5.1) | $>.99$ |
| MSM | 38 (95.0) | 18 (94.7) | 56 (94.9) | |
| Duration of HIV infection, years | 6.1 (3.2 – 8.9) | 7.9 (4.3 – 11.9) | 6.1 (3.5 – 10.6) | .36 |
| Had clinical AIDS | 8 (20.0) | 1 (5.3) | 9 (15.3) | .14 |
| CD4 cell count, per mm³ | 760.0 (570.5 – 873.0) | 697.0 (452.0 – 962.0) | 722.0 (520.0 – 878.0) | .46 |
| CD4 cell count, > 800 per mm³ | 16 (40.0) | 7 (36.8) | 23 (39.0) | .82 |
| Nadir CD4 cell count, per mm³ | 290.0 (109.0 – 398.5) | 292.0 (139.0 – 424.0) | 292.0 (130.0 – 408.0) | .82 |
| CD4/CD8 ratio | 0.9 (0.7 – 1.2) | 0.9 (0.7 – 1.1) | 0.9 (0.7 – 1.2) | .83 |
| BMI, kg/m² | 26.0 (23.2 – 27.6) | 27.0 (25.4 – 28.4) | 26.2 (23.5 – 27.7) | .15 |
| BMI categories, kg/m² | | | | |
| < 18.5 | 1 (2.5) | 0 (0.0) | 1 (1.7) | .52 |
| 18.5-24.9 | 15 (37.5) | 4 (21.1) | 19 (32.2) | |
| 25.0-29.9 | 19 (47.5) | 12 (63.2) | 31 (52.5) | |
| ≥ 30 | 5 (12.5) | 3 (15.8) | 8 (13.6) | |
| Antiretroviral therapy | | | | |
| 1NRTI+INSTI | 12 (30.0) | 5 (26.3) | 17 (28.8) | .29 |
| 2NRTI+INSTI | 13 (32.5) | 10 (52.6) | 23 (39.0) | |
| 2NRTI+NNRTI | 15 (37.5) | 4 (21.1) | 19 (32.2) | |

Values are frequencies or median with percentages or first to third quartiles in parenthesis. PLWH, people living with HIV. BMI, body mass index. NRTI, nucleoside reverse transcriptase inhibitors; NNRTI, non-nucleoside reverse transcriptase inhibitors; INSTI, integrase inhibitors.

References.

- Dong Y, Li Z, Ding S, Liu S, et al. HIV infection and risk of COVID-19 mortality: A meta-analysis. *Medicine (Baltimore)*. 2021;100(26):e26573
- FDA. AdviseDx SARS-CoV-2 IgG II. <https://www.fda.gov/media/146371/download>.

No severe adverse events were reported. Of 59 healthcare workers, median age 45.5 years, 50 (84.8%) had an antibody concentration between 1000 and 40000 AU/ml 3-months after the second dose of the BNT162b2 vaccine. The median antibody concentration in AZD1222 recipients was 505.4 (IQR, 196.3-1685.8) AU/ml whereas in BNT162b2 recipients it was 2740.9 (IQR, 1328.5-4847.4) AU/ml (Figure). No participant had COVID-19.

CONCLUSIONS

Vaccination with two doses of AZD1222 in PLWH under effective antiretroviral treatment and a high CD4 cell count led to a moderately successful antibody response which was lower than in healthcare workers receiving the BNT162b2 vaccine.