Persistence of Seroprotection After Modified Hepatitis B Vaccine Schedule in People Living with HIV

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BACKGROUND

Hepatitis B in the people living with HIV/AIDS (PLHIV) confers high morbidity, therefore, preventing with vaccine is crucial. The challenge regarding vaccination in PLHIV is achieving an effective vaccine response with high seroprotection rates and long-term protection, even with the decline of antibody titers over time.

The aim of this research is to evaluate the persistence of seroprotection, anti-HBs titers and anamnestic response to the challenge dose, following the schedule recommended by the Brazilian Ministry of Health (MH), of vaccination against HBV in PLHIV.

METHODS

Intervention study in PLHIV followed up in the coorte of outpatient clinics of the Infectious disease department at Federal University Hospital in Rio de Janeiro, who achieved seroprotection (anti-HBs ≥ 10 mIU/mL) with the primary anti-HBV vaccination (4 doses of 40µg), in the original study between 2006-2010.

In the current study (2021-2022), first was collected a blood sample, and one dose (40µg) of the anti-HBV vaccine was administered shortly thereafter, mimicking viral exposure. A second sample was taken between one and six months after this challenge dose. Seroprotection and antibody titers were assessed in both samples using commercial electrochemiluminescence assays for HBsAg, anti-HBc and anti-HBs. Individuals who received additional doses of the vaccine before this study were excluded.

In the statistical analysis, the Friedman test was used for categorical variables and the Wilcoxon test for continuous variables, with a significance level < 0.05.

RESULTS

- 75 of the 148 PLHIV in the original study participated (51%)
- 44% men, median interval between studies 14 years, age 53 years (36-75) and CD4 774 cells/mm³ (257-1936), 100% on ART and 99% with undetectable HIV viral load

PLHIV shows a **natural decline in antibody levels** over a decade after modified vaccination scheme. But after the **challenge dose,** simulating exposure to the hepatitis B virus, the seroprotection and **anti-HBs titers were restored.** Ensuring that the **4-dose vaccination schedule** with doubled doses (40µg) resulted in an anamnestic immunological response, and, therefore, **persistence of seroprotection.**

RESULTS

- A significant decrease in anti-HBs titers was observed between studies (baseline and current, p<0,01) and a significant increase in titers between pre- and post-immunization samples (p<0,01)
- The time interval between the challenge dose and the post-immunization sample did not affect anti-HBs titers (p=0,62)
- Markers of HBV infection (anti-HBc and HBsAg) were non-reactive in all participants

Table 1: Baseline clinical characteristics

Characteristics	Median (IQR), n/n (%)
Age	53 (36-75)
Male	33 (44%)
IMC kg/m²	26 (18-39)
Comorbidity	45 (60%)
Alcohol use	4 (0,05)
Smoking	4 (0,05)
Use of HAART	75 (100)
CD4 (cels/mm³)	774 (257-1936)
Undetectable HIV viral load	74 (99%)

Table 2: Seroprotection rate previous, before and after challenge dose (p<0,01)

Seroprotection (anti-HBs ≥ 10mUI/ml)	Previous seroprotection (2010) N/75 (%)	Seroprotection after 10 years N/75 (%)	Seroprotection after challenge dose N/75 (%)
No	0	14 (20,0)	3 (4,0)
Yes	75 (100)	61 (80,0)	72 (96,0)
Total	75 (100)	75 (100)	75 (100)

CONCLUSIONS

The scheme recommended by the Ministry of Health for vaccinating PLHIV against HBV resulted in sustained seroprotection for more than a decade. Even with the natural decline of antibodies, the use of a challenge dose was able to restore anti-HBs titers to the values obtained in the previous study.

This ensures that it is the best scheme in the primary response to vaccination, and important in the generation of lasting immunologic memory.

ADDITIONAL KEY INFORMATION

- Potsch DV, Oliveira ML, Ginuíno C, et al. High rates of serological response to a modified hepatitis B vaccination schedule in HIV-infected adults subjects. Vaccine. 2010;28(6):1447-1450.
- Potsch DV, Camacho LA, Tuboi S, et al. Vaccination against hepatitis B with 4-double doses increases response rates and antibodies titers in HIV-infected adults. Vaccine. 2012;30(41):5973-5977.

Table 3: Anti-HBs titers- previous, before and after challenge dose (p<0,01)

Anti- HBs titers (mUI/ml)	Previous seroprotection (2010) N/75 (%)	Seroprotecttion after 10 years N/75 (%)	Seroprotection after challenge dose N/75 (%)
<10	0	14 (18,7)	3 (4,0)
≥ 10	75 (100)	61 (80)	72 (96)
≥ 10-99	10 (13,3)	25 (33,3)	3 (4,0)
≥ 100-999	11 (14,7)	28 (37,3)	9 (12,0)
≥ 1000	54 (72,0)	8 (10,7)	60 (80,0)
Total	75 (100)	75 (100)	75 (100)