Performance of hepatitis rapid diagnostic tests in HIV-positive patients

Livia Melo Villar*,¹

¹Laboratory of Viral Hepatitis, Oswaldo Cruz Institute, Fiocruz, Rio de Janeiro, Brazil

*Author for correspondence: Tel.: 55 21 25621918; lvillar@ioc.fiocruz.br

“HBV RDTs demonstrate a good performance among HIV-infected individuals and could be used to identify HBV cases, particularly in poor resource areas and emergency situations.”

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Over the world, hepatitis B and C viruses (HBV and HCV) are major causes of chronic liver disease. HBV and HCV prevalence varies according to age, risk behaviors, population studied, and presence of coinfection with other viruses such as HIV [1–4]. Among HIV-infected individuals, a high prevalence of HBV and HCV infection has been reported [3,4].

In 2015, only 20% of the 71 million people living with HCV infection globally (14 million) knew their diagnosis [5]. Among HIV infected subjects it is important to diagnose HBV and HCV infection as soon as possible since the presence of co-infection may worsen the prognosis of disease and modify the type of treatment [6]. Nowadays, rapid diagnostic tests (RDTs) are used for the diagnosis of HBV and HCV due to their utility in emergency situations and remote areas without infrastructure [7–9]. These assays have a good performance in the general population [10–13], but few studies have evaluated their performance in HIV-infected subjects.

Recently, Barbosa *et al.* [14], found high sensitivity (>92%) and specificity (>99%) of RDTs Vikia HBsAg (Biomerieux, France) and Wama Immuno-Rapid HBsAg (Wama, Minas Gerais, Brazil) for both serum and whole blood specimens from HIV-infected subjects from Brazil. In addition, Franzcek *et al.* [7] found a sensitivity of 96% and a specificity of 100% for the RDT, determine HBsAg, using serum and whole blood among HIV-1 patients on recent antiretroviral treatment in Tanzania. Davies *et al.* [15] found 100% sensitivity and specificity for HBsAg detection in sera from 300 HIV-positive Malawian adults using the ‘determine rapid hepatitis B’ test.

On the other hand, Cruz *et al.* [9] found a high number of false negatives for the detection of HBsAg using RDTs Vikia HBsAg, Wama Immuno-Rapid HBsAg and Teste Rapido HBsAg (Dóles, Brazil) in HIV-infected subjects in Brazil. Hoffmann *et al.* [16] found 75% sensitivity and 100% specificity of determine HBsAg in HIV-infected, antiretroviral naive adults attending primary or antenatal care in urban South Africa. These results could be due to the low number of HIV samples included or titers of HBsAg lower than the assay limit. Other important issues that could affect RDT performance should be evaluated, such as, the effect of HBV genotypes, HBV viral load and mutations in the HBV S gene.

RDTs for anti-HCV detection such as Wama Immuno-rapid anti-HCV[®] and Bioeasy HCV Rapid Test[®] have sensitivities greater than 80% in HIV-infected individuals, this is lower than that found among non-HIV-infected subjects [8,14,17]. Kosach *et al.* [18] found sensitivity of the OraQuick HCV test to be 65.2% (95% CI: 42.8–82.8) after 20 min and 73.9% (95% CI: 51.3–88.9) after 40 min of incubation among HIV/HCV-infected subjects. Using the Multisure HCV test and serum samples of the same subjects, the sensitivity was 96.2% (95% CI: 80.4–99.9).

The low sensitivity of HCV RDTs in HIV-infected individuals could be the result of the immune suppression caused by the virus which in turn decreases the production of anti-HCV antibodies [19,20]. In addition, samples presenting discordant results for anti-HCV antibody detection among RDTs and enzyme immunoassays (EIAs) also have high HIV viral load demonstrating a negative impact of HIV viral load on the efficiency of RDTs. However, RDTs had a great performance in identifying cases of active HCV viremia (anti-HCV antibodies/HCV

RNA positive samples) in HIV-infected individuals [14], which could be helpful to identify those who should start on antiviral treatment.

Ribeiro *et al.* [14] also found that the performance of RDTs in the detection of HBsAg and anti-HCV antibodies is affected by antigen and antibody concentration among HIV-infected individuals since false-negative results in RDTs had lower mean ratio of optical density to cut off (OD/CO) values in EIA compared to true-positive samples. This situation could impact the usefulness of RDTs for HBV and HCV diagnosis in HIV-infected individuals who are in the early or convalescence period of infection. On the other hand, they did not observe low performance of RDTs for detection of HBV and HCV in relation to CD4 cell count and antiretroviral treatment. This could be very helpful since most of HIV-infected individuals are under treatment and present a high CD4 cell count.

In general, HBV RDTs demonstrate a good performance among HIV-infected individuals and could be used to identify HBV cases, particularly in poor resource areas and emergency situations. There is still controversy regarding the usefulness of HCV RDT in HIV infected individuals, Firdaus *et al.* [10] did not recommend these assays as the only diagnostic tool to be used in a high-risk group, such as HIV-positive individuals. However, these assays demonstrate good efficiency in identifying active HCV cases and in emergency situations or poor resource areas, could be the only method available. Public health authorities should evaluate the risk and benefits of using these methods among HIV-infected individuals.

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