

Co-encapsulation of Efavirenz and Curcumin within Polymeric Nanomicelles: Preliminary Studies †

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Abstract: In 2020 UNAIDS/WHO estimated that 37.7 million people were HIV positive. Recent studies have shown that patients who are HIV positive and fall ill with COVID-19 have double the risk of mortality than those who are HIV negative. Efavirenz (EFV) is a first-line antiretroviral drug with low oral bioavailability (40-45%) and low aqueous solubility (4 µg/mL). As of late, Curcumin (CUR) (a natural compound) has become relevant as a potential anti-HIV drug. However, the development of formulations with CUR, is limited by its low aqueous solubility (0.6 µg/mL). Considering these limitations, nano micelles of Soluplus® were developed to encapsulate EFV and CUR. DLS determined Micellar The micellar size, and the antioxidant activity of the micelles was measured by DPPH method. The water solubility of EFV and CUR increased 2500 and 3333 times, respectively. These nano micelles present a size of ~100 nm. Furthermore, the nanosystems remained stable when diluted (1/100) in different simulated biological fluids, even after 24 hours at 37 °C. The antioxidant properties of CUR were not affected by encapsulation. In addition, the *in vitro* cytotoxicity of the EFV and CUR nano micelles; tested on macrophages (RAW 264.7) and the *in vitro* hemolysis study (< 2 %) demonstrated that the formulation presents an excellent safety profile.

Keywords: HIV/AIDS; polymeric micelles; efavirenz; curcumin.

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Conflicts of Interest

The authors declare no conflict of interest.