Antiviral activity of two Acanthospermum species against herpes simplex virus 1

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Abstract

Ethnopharmacological relevance. *Acanthospermum* species are used in traditional medicine for treating various pathologies, including bacterial and viral infections. In a screening study, we identified the activity of the ethanolic extracts of *Acanthospermum australe* and *Acanthospermum hispidum* against herpes simplex virus 1 (HSV-1).

Aim of the study. In this work, we analyzed the phytochemical profile and antiviral activity of the chemical fractionation products of *Acanthospermum australe* and *Acanthospermum hispidum*. Additionally, we identified the effect of these fractions on different steps of the viral cycle.

Materials and methods. *Acanthospermum* samples were extracted with methanol and further partitioned with solvents of increasing polarities: hexane, chloroform, ethyl acetate, and butanol. Cytotoxicity and antiviral activity were analyzed for each fraction. The active fractions were tested to identify the virucidal effect and the inhibition of virus–cell binding. Further, the effect of these fractions on the replication and viral gene was quantitated by qPCR, and the expression of gD protein was evaluated by Western blot.

Results. The chloroform and hexane fractions of *Acanthospermum hispidum* and *Acanthospermum australe* showed dose-dependent antiviral activity. The chloroform fraction inhibited the virus–cell binding and virus cycle in a post-entry mechanism by decreasing replication and the expression of early and late viral genes. The hexane fraction did not inhibit virus binding; however, it showed antiviral activity in post-entry events by inhibiting the immediate-early, early, and late genes. We identified in both species the presence of 3.6-dimetoxiapigenin, axillarin, and penduletin in the chloroform fraction and methyl-(Z,Z)-9,12-octadecadienoate and phytol in the hexane fraction.

Conclusions. *Acanthospermum hispidum* and *Acanthospermum australe* possess antiviral activity against HSV-1 and affect different steps of the viral cycle. These characteristics make them good candidates for developing phytotherapeutic products against HSV-1.