

Chemical fingerprinting and cytotoxicity correlation of *Solanum americanum* leaves extracts via HPLC-DAD and LC-HRMS-based metabolomics

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Receipt: 18.10.2025

Revised: 25.11.2025

Acceptance: 27.11.2025

DOI: <https://doi.org/10.53552/ijmfmap.12.1.2026.37-52>

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ABSTRACT

A study was made to extract and characterize bioactive compounds from *Solanum americanum* aerial part (leaves) using a successive solvent extraction method, enriching polar compounds in the methanolic extract using TLC, UV, RP-HPLC, and LC-HRMS. Cytotoxicity (MTT, scratch assay) and hemolytic activity were evaluated to assess their anti-proliferative and wound-healing potential. HPLC-DAD analysis of *S. americanum* methanolic extract revealed two major polar compounds (65% and 14%) along with minor steroidal alkaloids and flavonoids. The extract exhibited saponin presence through persistent froth (2 cm, 15 min) and hemolysis at 100 µg/mL. LC-HRMS identified Tigogenin, Rhamnetin 3-O-glucoside, β2-Solamargine, and flavonoids. Cytotoxicity assays showed IC₅₀ values of 97.6, 717.36, and 1075.1 µg/mL for the hexane extract, ACN fraction, and hexane residue on Caco-2 cells, while the methanolic extract showed minimal cytotoxicity. On B16F10 cells, IC₅₀ values were 2841, 1051, and 544.2 µg/mL for the hexane extract, hexane residue, and EtOAc extract. In the scratch assay, the ACN fraction achieved full gap closure within 12 hours, while other extracts closed the gap in 24 hours, except for the methanolic extract, which inhibited cell migration.

Keywords: Cytotoxicity assay, HPLC-DAD, LC-HRMS, *Solanum americanum*, TLC, traditional medicine, wound healing