Isolation and characterization of werneria chromene and dihydroxyacidissimol from burkillanthus malaccensis (Ridl.) swingle

ABSTRACT

The secondary metabolites of endemic plants from the Rutaceae family, such as Burkillanthus malaccensis (Ridl.) Swingle from the rainforest of Malaysia, has not been studied. Burkillanthus malaccensis (Ridl.) Swingle may produce antibacterial and antibiotic-potentiating secondary metabolites. Hexane, chloroform, and methanol extracts of leaves, bark, wood, pericarps, and endocarps were tested against bacteria by broth microdilution assay and their antibiotic-potentiating activities. Chromatographic separations of hexane extracts of seeds were conducted to investigate effective phytochemicals and their antibacterial activities. Molecular docking studies of werneria chromene and dihydroxyacidissiminol against SARS-CoV-2 virus infection were conducted using AutoDock Vina. The methanol extract of bark inhibited the growth of Staphylococcus aureus, Escherichia coli, and Pseudomonas aeruginosa with the minimum inhibitory concentration of 250, 500, and 250 µg/mL, respectively. The chloroform extract of endocarps potentiated the activity of imipenem against imipenem-resistant Acinetobacter baumannii. The hexane extract of seeds increased the sensitivity of P. aeruginosa against ciprofloxacin and levofloxacin. The hexane extract of seeds and chloroform extract of endocarps were chromatographed, yielding werneria chromene and dihydroxyacidissiminol. Werneria chromene was bacteriostatic for P. aeruginosa and P. putida, with MIC/MBC values of 1000 > 1000 µg/mL. Dihydroxyacidissiminol showed the predicted binding energies of -8.1, -7.6, -7.0, and -7.5 kcal/mol with cathepsin L, nsp13 helicase, SARS-CoV-2 main protease, and SARS-CoV-2 spike protein receptor-binding domain S-RBD. Burkillanthus malaccensis (Ridl.) Swingle can be a potential source of natural products with antibiotic-potentiating activity and that are anti-SARS-CoV-2.