Antibacterial Activities of Metal-Natural Extract Complexes

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How, Fiona N.-F. [a] ; Kaida, Siti Aminah [a] ; Susanti, Deny [a] ; Ichwan, Solachuddin J.A. [b]

[a] Department of Chemistry, Kulliyyah of Science, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, Pahang Darul Makmur, Kuantan, 25200, Malaysia

Abstract

Metal-based compounds consist of an organic substituent as the ligand and an inorganic substituent as the metal center. Natural products, particularly natural extract, are well known to exhibit excellent biological activities, while the inorganic substituents are usually metal ions. Metal ions, especially transition metals, exhibit different oxidation states and can interact with any ligands. Advances in inorganic chemistry provide better opportunities to use metal-based compounds as therapeutic agents. The mode of action of these metal-based compounds on living organisms is different from non-metals. The unique properties of metal ions should be exploited to design new compounds. Pluchea indica (L.) Less (locally known as Beluntas), Clinacanthus nutans (locally known as Belalai Gajah), and Phyllanthus niruri (locally known as Dukung Anak) are medicinal plants that possess various biological properties. Incorporation of transition metal ions (Cu^{2+}, Ni^{2+}, Co^{2+}, Zn^{2+})

into the crude extracts from these medicinal plants would give metal-natural extract complexes of the plants. Leaves of Pluchea indica (L.) Less, Clinacanthus nutans, and Phyllanthus niruri were collected and extracted with either methanol or ethanol and reacted with various transition metal salts to yield metal-natural extract complexes. The metal-natural extract complexes were assessed for their antibacterial activities using quantitative and qualitative antibacterial assays against four pathogenic bacteria, which were Staphylococcus aureus (ATCC 29213), Bacillus cereus (ATCC 117788), Pseudomonas aeruginosa (ATCC 27853), and Escherichia coli (ATCC 25922). The antibacterial assays showed that the biological activities of the metal-natural extract complexes were enhanced and selective towards selected target bacteria. It was found that the identity of transition metal ions plays an important role in enhancing the bioactivity exhibited by the metal-natural extract complexes. The results showed that these metal-natural extract complexes of Pluchea indica (L.) Less, Clinacanthus nutans, and Phyllanthus niruri are potential alternative antibacterial agents.

Author keywords

antibacterial agent; Belalai Gajah; Beluntas; Clinacanthus nutans; Dukung Anak; metal-natural extract complexes; Phyllanthus niruri; Pluchea indica (L.) Less

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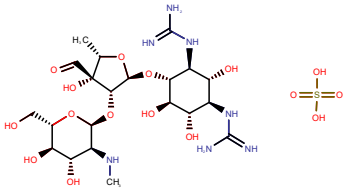

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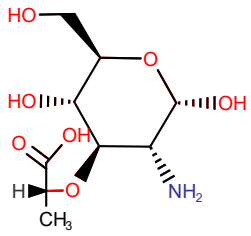

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Corresponding authors

Corresponding author	F.N.-F. How
Affiliation	Department of Chemistry, Kulliyyah of Science, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, Pahang Darul Makmur, Kuantan, 25200, Malaysia
Email address	howfiona@iium.edu.my