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Phytochemical and antimycobacterial activity of henna (*Lawsonia inermis L.*) extract, some phytoconstituents and their silver complex

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Tuberculosis is a major threat to the health of millions of populations. In this respect natural products having powerful antimicrobial effects remain important participants. The objective of this study aimed to investigate the antimycobacterial activity of *Lawsonia inermis* leaf methanolic extract, the phytoconstituents therein and some synthetic derivatives of the major components of 1,4-naphthoquinone (lawsone) and coumarin-3-carboxylic acid. Silver-metal-complexes of lawsone and coumarin-3-carboxylic acid were synthesized, characterized and tested for their antimycobacterial activity. An *in vitro* gold standard proportion method for Drug Susceptibility (DST) of 4 Rifampicin-sensitive and 4 Rifampicin-resistant *Mycobacterium tuberculosis (M.tb)* strains was used for the determination of biocidal activity. Results revealed that, crude extract of henna inhibited all tested *M.tb* strains at a concentration ≤50 mg/ml. GC-MS analysis of henna extract showed the presence of lawsone (20.19%), coumarin methyl esters (of about 29%) and phytol, squalene, dl-α-tocopherol, γ-sitosterol as minor constituents. 1,4-naphthoquinone, lawsone (2-hydroxy-1,4-naphthoquinone) and coumarin-3-carboxylic acid produced antitubercular activity ≤100, 500 and 500µg/ml respectively. Juglone (5-hydroxy-1,4-naphthoquinone) the isomer of lawsone and quinoclamine (2-amino-3-chloro-1,4-naphthoquinone) exhibited higher activity against M.tb strains at a concentration ≤150 µg/ml and 50µg/ml respectively. Silver metal complexation of lawsone and coumarin-3-carboxylic acid the antitubercular activity of each ligand was potentially increased ten times to score an activity ≤50 µg/ml. In conclusion, the enhanced biocidal effect in the 1,4-naphthoquinone nucleus produced by different derivatives proves that electrochemical behavior of quinones could be fundamental with respect to antitubercular activity. Moreover, silver metal complexes of lawsone and coumarin-3-carboxylic acid represent a therapeutic potential in the treatment of tuberculosis.

Biography

Anwar Mohammed Abdelrahman Abdelhalim has completed his PhD from Gezira University, Sudan. He is an Assistant Professor at Faculty of Pharmacy, University of Gezira, Sudan. He has published more than 4 papers in reputed journals.

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