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Abstract

In vitro antimycobacterial activity and cytotoxicity of compounds isolated from crude extracts of Solanum torvum Swartz. (Solanaceae).

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Abstract:

Tuberculosis (TB) caused by Mycobacterium tuberculosis complex represents a never-ending challenge towards which drug discovery efforts are needed. The current study was designed to isolate, elucidate and characterize the structure of safe and efficacious antimycobacterial compounds from the Ghanaian medicinal plant, Solanum torvum (Solanaceae) Swartz. The microplate alamar blue assay (MABA) was used to study the antimycobacterial activity of extracts of the unripe fruits and leaves of Solanum torvum while the MTS assay was used for cytotoxic studies. Compounds were isolated and purified from the hydro ethanolic extract of the unripe fruits and leaves of S. torvum through chromatographic techniques while their structures were elucidated using 1D and 2D NMR spectral data. Compounds were characterized and validated using physical and spectral data as well as comparisons with published structures in small molecule websites. A steroidal sapogenin and two phytosterols were isolated from the unripe fruits and leaves of Solanum torvum Swartz. respectively. Their structures were established as, (25S)-6β-hydroxy-5β-spirostan-3-one (Solagenin) (1), 24-ethylcholest-5-en-3 beta-ol (Sitosterol) (2) and (24S)-5, 22-Stigmastadien-3 beta-ol (Stigmasterol) (3). The steroidal sapogenin, solagenin, had minimum inhibitory concentration values of 62.5 µg/mL, 0.25 mg/mL and 2 mg/mL against M. bovis strain (ATCC® 35720™), M. tuberculosis strain H37Ra (ATCC® 25177™) and M. smegmatis (ATCC® 19420™), respectively. Cytotoxicity of the isolated compounds towards normal Chang liver cells (ATCC® CCL-13™)) varied, and solagenin exhibited the most promising selectivity index value of 27.2. In conclusion, the steroidal sapogenin, (25S)-6β-hydroxy-5β-spirostan-3-one (Solagenin) has demonstrated, for the first time, selective efficacy against the pathogenic Mycobacterium bovis. Structure-activity relationship studies are required towards development of a new class of molecules with activity against sensitive and drug resistant strains of M. bovis.

Biography:

Joseph Mwanzia Nguta is a Veterinary surgeon by training and Pharmacologist and Toxicologist by specialization. Currently, he is a Senior Lecturer at the Department of Public Health, Pharmacology and Toxicology (PHPT), University of Nairobi with twelve (12) years' experience in undergraduate and postgraduate teaching and supervision. Dr. Nguta holds MSc and Ph.D. qualifications in natural product Pharmacology and Toxicology from the University of Nairobi. In addition, he holds Postdoctoral qualifications from Noguchi Memorial Institute for Medical Research (NMIMR), College of Health Sciences, University of Ghana, where he pursued drug discovery against zoonotic tuberculosis from natural products of plant biodiversity.

Recent Publications:

1. In vitro antimycobacterial activity and toxicity of eight medicinal plants against pathogenic and non-pathogenic mycobacterial strains. International Journal of Mycobacteriology 2016
2. vitro antimycobacterial and cytotoxic data on medicinal plants used to treat tuberculosis. Data in Brief Journal 2016
3. Antimycobacterial and cytotoxic activity of selected medicinal plant extracts. Journal of Ethno pharmacology. 2016

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