ANTI-INFECTIVE ACTIVITY, PHYTOCHEMISTRY AND CYTOTOXICITY OF *DALBERGIA MELANOXYLON* GUILL. & PERR AND *ORMOCARPUM SENNOIDES* SSP. *ZANZIBARICUM* BRENAN & J.B. GILLETT

ABSTRACT

Introduction: Infectious diseases account for 90% of the disease burden worldwide with a significant rampage being felt in developing countries. This is coupled by the widespread antibiotic resistance to available conventional drugs. Infectious agents have been reported to raise the risk of human cancer which is a major cause of mortality worldwide. The aim of this study was to investigate *Dalbergia melanoxylon* Guill. & Perr and *Ormocarpum sennoides* subsp. *zanzibaricum* Brenan & J.B. Gillett as potential anti-infective and anticancer agents. **Methodology**: Chromatographic separation of the CH_2Cl_2/MeOH (1:1) extracts of the roots and root bark of *O. sennoides* subsp. *zanzibaricum* and *D. melanoxylon* was done respectively. The structures and absolute configuration of the isolated compounds were elucidated by Mass spectrometry, Nuclear magnetic resonance and Electronic circular dichroism spectroscopy. The antibacterial activity of the crude extract and the isolated compounds against *Bacillus subtilis* and *Aliivibrio fischeri* was determined in a turbidimetric assay. The pure compounds were subjected to a panel of human pathogenic bacteria (*Enterococcus faecalis, Escherichia coli, Mycobacterium vaccae, Staphylococcus aureus*, methicillin resistant *Staphylococcus aureus* and *Pseudomonas aeruginosa* using agar diffusion assay. The crude extracts were tested for antifungal activity against *Phytophthora infestans*, *Botrytis cinerea*, and *Septoria tritici* using turbidimetric assay. The pure compounds were subjected to further antifungal testing against human pathogenic fungi (*Sporoidiobolus salmonicolor, Candida albicans* and *Penicillium chrysogenum*) using agar diffusion assay. The crude extracts of *O. sennoides* subsp. *zanzibaricum* and *D. melanoxylon* (500 μg/ml) were tested for anthelmintic activity using *Caenorhabditis elegans*. The cytotoxicity (CC_{50}) of the crude extracts against the human prostate cancer (PC-3) and colon adenocarcinoma (HT-29) was performed using colorimetric cell viability assays. The cytotoxicity assay against HeLa cells was performed on the most promising active pure compound using the methylene blue assay. **Results**: Phytochemical investigation of root and root bark of *O. sennoides*

subsp. *zanzibaricum* and *D. melanoxylon* resulted in the isolation of twenty compounds (**1-20**), of which seven are new. The root bark of *D. melanoxylon* yielded six previously undescribed prenylated isoflavanones (**1-6**), alongside isoflavanoids (**7-10**), neoflavones (**11-13**) and alkyl hydroxycinnamates (**14**). A new biflavonoid, trime-chamaejasmin (**15**) alongside two known biflavonoids (**16-17**), bi-4-phenyldihydrocoumarin (**18**), isoflavan (**19**), triterpenoid (**20**) were also isolated from the roots of *O. sennoides* subsp. *zanzibaricum*. The crude extracts at 50 and 500 µg/mL exhibited promising antibacterial activity against *Bacillus subtilis*. (3*R*)-tomentosanol B (**9)** and sophoraisoflavanone A (**10)** caused inhibition against both *B. subtilis* and *Aliivibrio fischeri* assays. Kenusanone H (**7**) and (3*R*)-tomentosanol B (**9**) exhibited promising antibacterial activity against Gram-positive bacteria including methicillin resistant *S. aureus* and *M. vaccae* showing minimum inhibitory concentrations between 0.8 and 6.2 µg/mL. Both crude extracts showed promising antifungal activity against all phytopathogens at 125 µg/mL. Sophoraisoflavanone A (**10)** and Kenusanone H (**7**) at 42 µg/mL showed very promising activity against *P. infestans*, *B. cinerea* and *S. tritici* respectively. For the most promising candidate, kenusanone H (**7**), the CC_{50} against HeLa cells was 1.8 ± 1.4 µg/mL (4.2 µM). **Conclusion**: The crude extracts of both *O. sennoides* subsp. *zanzibaricum* and *D. melanoxylon* are not toxic in general but show selective antibacterial and antifungal activities. Overall, *D. melanoxylon* and *O. sennoides* subsp. *zanzibaricum* have a vast array of unique structures and are also a good source of anti-infective compounds.

Key words: Anticancer; isoflavanones; infectious diseases, antibacterial; antifungal; anti-helminthic; cytotoxic activities