ABSTRACT

Ethnopharmacological relevance

Seven medicinal plants from Ugandan flora, namely *Entada abyssinica*, *Khaya anthotheca*, Vernonia amygdalina, *Baccharoides adoensis*, *Schkuhria pinnata*, *Entandropragma utile* and Momordica *foetida*, were selected in this study. They are used to treat conditions and infections ranging from inflammations, pains and fevers to viruses, bacteria, protozoans and parasites. Two of the plants, *V. amygdalina* and *M. foetida*, are also used as human food or relish, while others are important in ethnoveterinary practices and in zoopharmacognosy in the wild. The aim of this study was to evaluate the *in vitro* antiplasmodial, antitrypanosomal and antileishmanial activities, along with cytotoxicity of the multi-component extracts of these plants.

Materials and methods

Different parts of the plants were prepared and serially extracted with hexane, petroleum ether, dichloromethane, ethyl acetate, methanol and double distilled water. Solvent free extracts were assayed for *in vitro* inhibition against four reference parasite strains, Plasmodium falciparum (K1), Trypanosoma brucei rhodesiense (STIB 900), Trypanosoma cruzi (Talahuen C2C4) and Leishmania donovani (MHOM-ET-67/L82) using standard methods. Toxicity was assessed against L6 skeletal fibroblast and mouse peritoneal macrophage (J774) cells and selectivity indices (SIs) calculated for the most active extracts.

Results

The strongest activities, demonstrating median inhibitory concentration (IC_{50}) values ≤ 2 μg/ml, were observed for the dichloromethane and petroleum ether extracts of *K. anthotheca*, *B. adoensis* and *S. pinnata*. Overall, IC_{50} values ranged from < 1 μg/ml to > 90 μg/ml. Out of 22 extracts demonstrating IC_{50s} < 20 μg/ml, seven were against *T. b. rhodesiense* (IC_{50}: 1.6–16.2 μg/ml), six against *T. cruzi* (IC_{50}: 2.1–18.57 μg/ml), none against *L. donovani* (IC_{50}: falling > 3.3 and >10 μg/ml), and nine against *P. falciparum* (IC_{50}: 0.96 μg/ml to 4.69 μg/ml). Selectivity indices (SI) calculated for the most active extracts ranged from <1.00 to 94.24. However, the *B. adoensis* leaf dichloromethane extract (a) was equipotent (IC_{50} = 3.3 μg/ml) against *L. donovani* and L6 cells respectively, indicating non-specific selection. Trypanosome and *Plasmodium* parasites were comparatively more sensitive to the test extracts.

Conclusions

The benefits achieved from the seven tested plant species as traditional ethnomedicinal and ethnoveterinary therapies or in zoopharmacognosy against infections and conditions of animals in the wild are strongly supported by results of this study. The synergy of plant extracts, so achieved by concerted actions of the ligands, produces adequate perturbation of targets in the four parasite genera, resulting in the strong potencies exhibited by low IC_{50} values. The total inhibitory effect, achieved as a sum of perturbations contributed by each participating compound in the extract, minimises toxic effects of the compounds as seen in the high SI's obtained with some extracts. Those extracts demonstrating SI ≥ 4 form promising candidates for further cell-based and system pharmacology studies.