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Harnessing nature: a systematic exploration of in vitro antileishmanial and antihuman African trypanosomal properties in traditional medicinal plants and their active principles

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Abstract

Context: Current treatments for leishmaniasis and Human African Trypanosomiasis (HAT) are constrained by toxicity, high costs, and the growing threat of parasite resistance. In this context, natural products have emerged as promising alternatives, offering the potential for safer and more cost-effective therapeutic interventions. **Objective:** This review assesses the antileishmanial and antitrypanosomal activities of medicinal plants, underscoring their significance in addressing parasitic diseases and identifying promising candidates for future drug discovery and development.

Methods: Following the PRISMA 2020 guidelines, a systematic search was conducted for literature published between 2003 and 2023. Studies were considered eligible if they reported in vitro activities of extracts or compounds against *Leishmania* spp. or *Trypanosoma brucei* with $IC_{50} < 10 \mu\text{g/mL}$. Data included plant species, extraction methods, parasite strains, active compound(s), cytotoxicity profiles, and traditional uses. The quality of each study was evaluated based on the reproducibility of experimental procedures. Results and conclusions: A total of fifty eligible articles were included. 217 plants demonstrated potent activity ($IC_{50} < 10 \mu\text{g/mL}$) against *Leishmania* spp. and/or *T. brucei*. Among these, 41 species had documented traditional use in the treatment of leishmaniasis or HAT, whereas 76 were traditionally employed for unrelated ailments yet exhibited scientific evidence of antiparasitic efficacy. Notably, 67 species were active against both parasites, 120 displayed selective antitrypanosomal, and 30 showed selective antileishmanial activities. Exemplary candidates include *Achillea ptarmica* L. (pellitorine), *Allium sativum* L. (allicin, ajoene), *Strychnos spinosa* Lam. (triterpenoids), *Tridax procumbens* L. (oxylipin), and *Marrubium incanum* Desr. (salvigenin). More studies should define mechanisms and in vivo efficacy. Systematic review registration: Not registered. © 2026 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Author keywords

antiparasitic compounds; Leishmanicidal; medicinal plants; natural products; trypanocidal

Indexed keywords

EMTREE drug terms

ajoene; allicin; antiparasitic agent; garlic extract; natural product; oxylipin; salvigenin; triterpenoid

EMTREE medical terms

Achillea; African trypanosomiasis; antileishmanial activity; antitrypanosomal activity; cytotoxicity; drug analysis; drug development; drug therapy; garlic; human; IC_{50} ; in vitro study; leishmaniasis; Marrubium; medicinal plant; nonhuman; pharmacology; Preferred Reporting Items for Systematic Reviews and Meta-Analyses; reproducibility; review; *Strychnos*; systematic review; *Tridax procumbens*; *Trypanosoma brucei*

Chemicals and CAS Registry Numbers

Unique identifiers assigned by the Chemical Abstracts Service (CAS) to ensure accurate identification and tracking of chemicals across scientific literature.

ajoene	92285-01-3
allicin	539-86-6
salvigenin	19103-54-9

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