Ghanaian herbal medicines exhibit promising *in vitro* activity against neglected tropical diseases (NTDs)

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Abstract (300 word limit)

Statement of the Problem: Neglected tropical diseases (NTDs) constitute a huge public health concern in developing countries, including Ghana. Conventional treatments for these are hampered by reduced efficacy due to overuse and drug resistance, unavailability, and unaffordability. Conversely, herbal medicines are widely patronized among these population for various healthcare needs, NTDs inclusive. Besides their greater affordability and accessibility, they are perceived as relatively safer than orthodox medicines. However, the limited scientific evidence of their therapeutic claims is a cause of great concern and merits systematic investigation. Methodology: Extracts of fifteen herbal medicines used locally to treat three endemic NTDs were obtained from the Ghana Federation of Traditional Medicine Practitioners Association and screened *invitro* for efficacy against schistosomiasis, onchocerciasis, and African trypanosomiasis. The most active extract was subjected to bioassay-guided fractionation for isolation and characterization of its bioactive constituent. Findings: Generally, the extracts demonstrated greater antionchocercal activity than antischistosomal activity. Further, juvenile schistosomes and adult-stage male onchocerca worms were more susceptible (≤100% inhibition) to the extracts than adult-stage schistosomes (≤84.3% inhibition) and onchocerca female worms (≤98.8%). Overall, the extracts were most active against the trypanosomes (IC_{50} = 5.63 µg/mL to 18.71 µg/mL). Hence, the antitrypanosomal assay was selected for bioactivity-guided fractionation of the most active extract which led to an eupatoriochromene-rich oil (42.6%) with 1.3-fold (IC_{50} <0.0977 µg/mL) greater activity than the standard antitrypanosomal drug, diminazene aceturate (IC_{50} = 0.13 µg/mL). These findings suggest a promising prospect for herbal medicines as very useful sources for the much-needed new or alternative NTD drug discovery efforts. Concurrently, safe, efficacious, and standardized herbal medicines should be developed and promoted through rigorous scientific validation.

Image

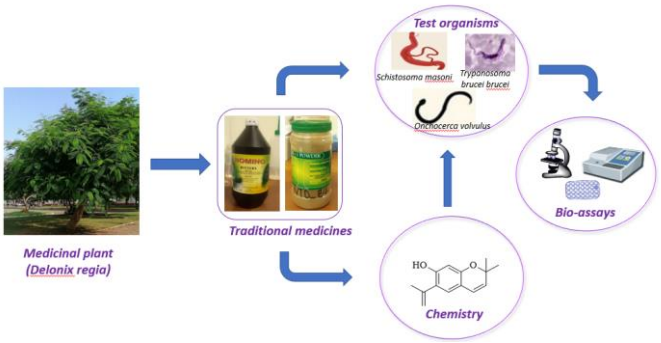


Figure 1: Chemical and Biological Investigation of Ghanaian Herbal Medicines for Activity against NTDs

Recent Publications (minimum 5)

1. Amewu R.K., Amoateng P., Arthur P.K., … Osei-Safo D., Kevin D.R., Gilbert I.H, Yeboah-Manu D. (2022). Drug discovery research in Ghana, challenges, current efforts, and the way forward. PLoS Neglected Tropical Diseases, 15;16(9): e0010645. https://doi.10.1371/journal.pntd.0010645
2. Amewu, R.K., Sakyi, P.O., Osei-Safo, D. & Addae-Mensah, I. (2021). Synthetic and Naturally Occurring Heterocyclic Anticancer Compounds with Multiple Biological Targets. Molecules, 26, 7134 doi.org/10.3390/molecules26237134
3. Chama, M. A., Onyame, H. A., Fleischer, C., Osei-Safo, D.,... Addae-Mensah, I., Wilson, M. D. (2020). In vitro activities of crude extracts and triterpenoid constituents of *Dichapetalum crassifolium* Chodat against clinical isolates of Schistosoma haematobium. Heliyon 6 e04460. https://doi.org/10.1016/j.heliyon.2020.e04460
4. Tchokouaha Yamthe, L. R., Philips, T. J., Osei-Safo, D., … Wilson, M. D. (2020). Antileishmanial effects of *Sargassum vulgare* products and prediction of trypanothione reductase inhibition by fucosterol. Future Drug Discovery, 0.4155/fdd-2020-0002
5. Osei-Safo, D., Dziwornu, G. A., Salgado, A., Sunassee, S. N. & Chama, M. A. (2017). Bi- and bisbibenzyls from the roots of *Dichapetalum heudelotii* and their antiproliferative activities. Fitoterapia 122, 95–100

Photograph



Biography (150 word limit)

Dorcas Osei-Safo's primary research area is Natural Product Chemistry with a focus on isolating and characterizing bioactive compounds from medicinal plants for drug discovery in cancer, microbial infections, epilepsy, and NTDs – schistosomiasis, trypanosomiasis, and onchocerciasis. Coming from an area where traditional medicines are widely used, she is passionate about scientific validation of the therapeutic claims of these remedies and has recently turned her attention to investigating a selection used against some NTDs. She also has an interest in drug quality and part of her research has been dedicated to the development and application of quality assurance methods for antimalarials and antibiotics distributed for use in Ghana and some other African countries through the quantification of their active pharmaceutical ingredients in comparison with pharmacopoeia specifications.

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Notes/Comments: