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The antiplasmodial compounds from *Phyllanthus fraternus*

Gustav Komlaga, P Champy, R A Dickson, M L K Mensah and **P M Loiseau**
Kwame Nkrumah University of Science and Technology, Ghana

Malaria is a major public health problem in Ghana where it is treated, among many other diseases, with medicinal plants and allopathic drugs. Due to the relief achieved from the use of medicinal plants for the treatment of the disease by clients of traditional medicine, a search for anti-plasmodial compounds from the plants was initiated as way to validate their use. An ethnobotanical survey conducted in two Districts of Ghana, inventoried, among other plant for the traditional treatment of malaria, *Phyllanthus fraternus*. This plant was employed by a high percentage of herbalists for the treatment of malaria in the surveyed areas. However, despite the high level usage for the treatment of malaria, it had not been extensively exploited for antiplasmodial compounds. It was therefore selected for screening for these compounds. The aqueous extract evaluated against chloroquine-susceptible 3D7 and chloroquine-resistant W2 strains of *P. falciparum* displayed remarkable activity against 3D7 (IC50: 4.07 ± 1.46) but was inactive against W2 (IC_{50} >100 µg/mL). It also showed cytotoxicity against human umbilical vein endothelial cells (HUVECs) with CC50 value of 31.11 ± 3.31 µg/mL. It was, however, selective for the 3D7 *P. falciparum* with selectivity index (SI) of 7.6. The organic solvents fractions of the plant obtained by successive extraction with petroleum ether, ethyl acetate and methanol were also evaluated against 3D7 *P. falciparum*. These fractions exhibited impressive antiplasmodial activity against the 3D7 *P. falciparum* (0.44±0.08µg/mL ≤ IC50≤37.92±14.50 µg/mL) with the methanol fraction being the most active (IC50: 0.44±0.08µg/mL). A follow-up phytochemical studies of the methanol extract yielded the lignan, phyllanthin, and 5 securinega alkaloids namely bubbialine, epibubbialine, ent-norsecurinine, allo-norsecurinine, nirurine. These compounds displayed varied degrees of antiplasmodial activity against both 3D7 and W2 strains of *P. falciparum* with IC50 ranging from 1.14 ± 0.32µM to 59.00±5.43 µM. Ent-norsecurinine, which was for the first time isolated from a natural source, was the most active (IC_{50}=1.14±0.32 µM) against the *P. falciparum* W2 strain. Only nirurine and phyllanthin displayed cytotoxicity (CC50 <100 µM) against HUVECs. Apart from phyllanthin and nirurine, the other 4 compounds displayed specific selectivity for the parasites (SI>3.6). The findings of this study validates the traditional use of the plant in the treatment of malaria and also point to the need to proceed with the screening of medicinal plants used to treat malaria in traditional medicine which may lead to identification of new and or lead compound(s) for antimalarial drugs.

Biography

Gustav Komlaga is a Senior lecturer and a researcher of Pharmacognosy in the Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana. He holds a PhD degree in Pharmacognosy from KNUST, Kumasi, Ghana, and another in Microbiology from Université Paris-Sud, France. He is interested in researches involving drug discovery with regards to identification and validation of medicinal plants traditionally used to treatment malaria and other infectious diseases, isolation and characterization of bioactive compounds form medicinal plants, standardization of medicinal plants and herbal products for the treatment of diseases. He has published more than 10 research papers in reputable peer review journals and is a reviewer for many scientific journals.

gustkomla@yahoo.com

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