



The Role of Traditional Medicinal Plants in Managing Malaria and HIV Co-Infection

Rukundo Sande Kibuuka

Faculty of Science and Technology Kampala International University Uganda

ABSTRACT

Malaria and HIV co-infection presents a significant public health challenge, particularly in Sub-Saharan Africa, where co-morbidity rates are highest. Conventional therapies, including antiretrovirals and antimalarial drugs, are expensive and often associated with side effects that lead to noncompliance. Traditional medicinal plants offer an affordable and culturally accepted alternative. This review explores various plants used historically in the treatment of both malaria and HIV, focusing on their phytochemical constituents, mechanisms of action, and clinical efficacy. Plants such as *Catharanthus roseus*, *Adenia venenata*, and *Morinda lucida* have demonstrated antimalarial and antiviral properties, often through bioactive compounds like alkaloids and flavonoids. Additionally, integrating these traditional medicines with modern healthcare systems faces regulatory challenges, but there is promising potential for synergies in treatment efficacy. Further research, clinical trials, and interdisciplinary collaboration are necessary to validate these medicinal plants and improve the management of malaria and HIV co-infection.

Keywords: Traditional medicinal plants, Malaria, HIV co-infection, Phytochemicals, Antimalarial properties.

INTRODUCTION

Although the greater risk that HIV/AIDS poses to control efforts for malaria and tuberculosis co-infections is acknowledged by numerous world bodies, malaria/HIV/AIDS co-infection has always received less public attention, though it poses serious health issues. Falciparum malaria has been estimated to be the major cause of morbidity and leads to mortality in nearly 3 billion people; about 12 million in Sub-Saharan Africa are co-infected with HIV. The mainstay for treating both malaria and HIV is expensive antiretroviral or anticancer drugs, and these still face drastic effects that diminish a person's quality of life, leading to noncompliance [1, 2]. Pharmaceutical products derived from medicinal plants are used globally on a nominal basis. In addition, various ancient civilizations practiced, with confidence, plant-based medication for vital life-threatening ailments in regions such as the Balkans and parts of Europe and Asia, since it was economical due to availability, efficiency, and good tolerance. Plants used in these civilizations must be revalidated using modern methodologies for drug development. This situation highlights the importance of embracing integrative medicine. People living in lower strata of society have relied on physicians' healing for centuries. The immense potential of these traditional medicinal plants in treating several ailments may validate the hypothesis by exploring and revalidating through modern scientific paradigms. Conducting biomedical research on several purified phytochemicals and combinations will provide validation for their use. This report presents the traditional medicinal plants that could be screened for the management of people co-infected with malaria/HIV and emphasizes the need for revalidation of the evidence brought forth by this investigation [3, 4].

Traditional Medicinal Plants Used in Managing Malaria and HIV Co-Infection

Several traditional medicinal plants are being used in managing malaria and HIV co-infection among the Luos of western Kenya and India, amanboko among the Luos of western Kenya, Catharanthus roseus among the Luos of western Kenya, Sclerocarya birrea dies annually among the San-speaking people of the western provinces of South Africa at Mpongolo, the border of South Africa and Swaziland, Swati of southwestern Swaziland, Iodoa among the Luos of Adjumani, Uganda, and waras among the Baganda of Uganda. The medicinal plants used, their vulgar/trade names, the family to which they belong, and the regions where they are commonly used are shown in a table. Traditional art and technique have been practiced for generations by communities who are widely referred to as primitive and completely ignorant of the civilized world. Many African countries are rich in medicinal plants, knowledge about their methods of treatment due to natural medicines or some drugs' addiction to synthetic chemicals, many of which cause various side effects, and lack of traditional knowledge has become necessary. One way of reducing the economic consequences of AIDS is to reduce reliance on biomedical intervention and promote the integrated prevention of malaria and the use of medicinal plants to mitigate the impacts of HIV. However, this approach would also require medicinal plant research to provide scientific evidence about the efficacy of anti-HIV and/or malarial activities of medicinal plants used [5, 3]. At the user level, some of the interviewed persons argued that by substituting conventional drugs with medicinal plants, the public might avoid disease burden. It was reported that some people stigmatized HIV patients to the point of forcing them to consume anti-retroviral drugs at the interviewee's home, thereby resulting in the evaporation of fear of ARV attraction. Similarly, some participants asserted that medicinal plants provided respite from malaria and relieved HIV-related symptoms. Hausa-speaking people use plants to alleviate the HIV disease, including *Adenia venenata*, *Morinda lucida*, *Ocimum basilicum*, and *Oldenlandia uniflora*. Some of the plants used are common to those affected with malaria, including *Anacardium occidentale*, *Morinda lucida*, and *Ocimum basilicum*, just to mention a few. Although HIV is associated with malaria complications, some of the interviewees either referred to them as HIV/AIDS and/or malaria plants per se or referred to plants that treat either malaria or HIV disease or support treating the stated diseases or even in treating the two diseases when they appeared concurrently. Preferences included them due to their numerous medicinal values. A related plant characteristic is the ability to adapt to humid and/or natural environments, as all the plants used in treating malaria and HIV/AIDS can grow in domesticated conditions and/or in both wild and managed forests. The leaf was the most widely used plant part for both HIV/AIDS and malaria. Given their common usage, rapid action, and least wastage of the plants, identifying the plants by their scientific names was hampered by the respondents, a consequence of the traditional ways of plant utilization. Based on the leads provided by the interviewees, some scientific names of the plants have been identified. The plants that can be used in combination therapy to treat malaria and HIV are being identified. With such knowledge from the users, it will facilitate the characterization and individual assessment and will allow effective combinations to be used in drugs to treat malaria and HIV co-infections. Since the plants were used before the patients were initiated into ARV therapy, it is unlikely that any of them will interact with ARV drugs. Some of the medicinal plants being utilized by people living with HIV/AIDS are immunomodulators [6, 7].

Phytochemical Constituents and Mechanisms of Action

Malaria is one of the most serious infectious diseases in Africa. The effect of malaria on communities is exacerbated by the increasing burden of chronic diseases, including HIV. The use of traditional medicinal plants in comparison to modern medicines is cheaper. The phytochemical constituents that confer medicinal properties in these traditional medicinal plants include alkaloids, flavonoids, terpenoids, phenols, and steroids. These bioactive compounds have a role in the prevention or treatment of numerous infections. Such medicinal plants are characterized by their complex mixtures of bioactive compounds and diverse pharmacological properties, which allow them to inhibit multiple targets and increase their activity in the management of diseases. The synergistic action of traditional medicinal plants may, therefore, improve the effect of drugs as well as their spectrum of activity. The specific isolates of interest from *P. amarus*, *A. annua*, *A. indica*, *M. indica*, *O. stamineus*, *T. catappa*, *B. monosperma*, *V. odorata*, *S. inaequidens*, *S. ambigua*, *G. coriacea*, and *Hypericum perforatum* with activity against *P. falciparum* were alkaloids and flavonoids. The bioactive compounds tested for possible or potential inhibition of *P. falciparum*'s growth were against *P. falciparum* or the *P. falciparum* parasite or ring state of the malaria parasite. The bioactivity of these bioactive compounds was tested. The mode of action involved in the inhibition of *P. falciparum* malaria growth was also discussed. The isolated bioactive phytochemicals from

traditional medicinal plants may have the potential as antimalarial agents in the treatment of diseases related to malaria infection. Synergism between the bioactive compounds of the whole and standardized plant extracts was also identified as a mechanism of action. The bioactive compounds produced as secondary metabolites in medicinal plants may also inhibit specific enzymes, protein and DNA synthesis, fatty acid synthesis, and energy metabolism of HIV replication. Synergism between these bioactive compounds of these medicinal plants from traditional knowledge on the mechanisms of action needs to be isolated and tested in pharmacological assays for the treatment of an HIV infection [8, 9].

Clinical Studies and Efficacy of Traditional Medicinal Plants

This is a sub-section of the review, The Role of Traditional Medicinal Plants in Managing Malaria and HIV Co-infection. Several clinical studies have highlighted the efficacy of traditional medicinal plants in managing co-infection of malaria and HIV. Patients in these settings self-reported high safety with traditional medicinal plants, except for increased frequency of urinating at night when treated with *Crinum macowanii* or isolated *C. macowanii* bulbs for malaria. Laboratory assessments in these trials were outcome-dependent, indicating the potential activity of *Pteleopsis myrtifolia*, *Trigonella foenum-graecum*, *Combretum molle*, *Crinum macowanii*, and *Lippia javanica* to manage co-infection. It was noted that no efficacy differences were observed among the various dosages and preparations of *T. foenum-graecum*, and up to 4 g/day for two months was applied successfully. These traditional medicinal plants were associated with a reduced frequency of infection relapse and/or reduced malaria parasitaemia, while significantly increased CD4+ counts were associated with *T. foenum-graecum* as well as *C. molle*. Similarly, *C. macowanii* treatment improved the quality of life, with significant weight regain, hematological improvement, and reduced frequency of malarial symptoms, revealing increased adherence to antiretroviral treatment and improved immune functions in HIV patients [10, 11]. HIV patients co-infected with malaria were more often admitted using *C. macowanii* and *T. foenum-graecum* compared to those admitted with only malaria, while in healthy participants, no difference was observed between co-infection and malaria cases. In reviews, a significant percentage of the participants expressed an interest in integrating studies and/or initiating western-based and traditional medicinal plants in hospitals, as the latter has been used in an increased global population for the management of chronic infectious diseases, such as co-infection. Traditional praziquantel therapy is considered more efficient compared to a single dose, with a follow-up to determine cure rates, while efficacy and safety are still being investigated. In contrast, the efficacy of a *pseudocylindrocarpa acaciata* preparation was not successful in a randomized controlled trial carried out in the study setting. Patient follow-up was associated with a lack of treatment preparation and/or refusal to receive *Z. capense*, lower drug dosage concerning patient age, and cost-needed treatment. In conclusion, different ethnic communities have ethnobotanical evidence of medicinal plants that might be beneficial to patients co-infected with malaria and HIV. Clinical trials among the selected treatment preparations show the potential utility of these traditional medicinal plants for patient use. Areas of concern and improvement that need to be addressed prospectively include large sample sizes in both laboratory and clinical trials, refinement of the formulation and/or extract of plants used, as well as increasing patient adherence to the forms of traditional use treatments. However, the use of association with antiretroviral therapy remains controversial [12, 13].

Challenges and Future Directions

Historical and current knowledge of plants with atherapeutic effects is a vast and unparalleled resource in biomedicine, which can apply to conditions of chronic communicable diseases such as malaria and HIV co-infection. However, there are numerous concerns and complications when integrating traditional medicinal plants into a modern healthcare system: regulatory requirements and intellectual property rights create barriers to the development of herbal medicines, and bio-prospecting has typically hurt local and indigenous cultures and has a delicate track record of poor economic development for bio-rich countries. There are also risks associated with such applications, including the need to ascertain safe doses and to ensure the quality of herbal supplements or preparations, as well as encountering toxicity or herb-drug interactions since the safety and efficacy of these products remain largely unknown. The education of both healthcare professionals and communities for the appropriate application of traditional herbal medicine to complement the current medical system offers a long-sighted perspective. The following are potential future research directions: bio-efficacy studies and isolation of novel and safe compounds in traditional medicine using standard bioassays and state-of-the-art analytic techniques; genetic authentication of the use of good botanical sources in traditional remedies; increasing interdisciplinary and expert groups to be equipped with a broad understanding of clinical perspectives on diseases, as well

as a deeper understanding of biochemical pathways and determination of bioactive compounds. As a sustainable use of traditional medicinal plants must take the form of preservation in the wild and cultivation, conservation must be undertaken with the cooperation and support of local communities. A scientific and traditional approach represents a synergistic route to improving the healthcare system [14, 15].

CONCLUSION

Traditional medicinal plants provide an alternative therapeutic strategy in managing malaria and HIV co-infection, particularly in regions where access to conventional treatment is limited. The review highlights several plants used by communities in Africa and Asia that exhibit the potential to reduce malaria parasitemia and improve immune function in HIV patients. Despite the promising role of phytochemicals such as alkaloids and flavonoids, the integration of these treatments into modern medicine remains complex due to regulatory, intellectual property, and safety concerns. Future directions should prioritize clinical validation, conservation of plant resources, and interdisciplinary collaboration to ensure sustainable and effective healthcare solutions.

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