

Evaluating the Effectiveness of Traditional Herbal Medicine in Reducing Malaria Parasite Load in Children under Five in Sub-Saharan Africa: A Randomized Controlled Trial

Alberta Jeanne N.

School of Applied Health Sciences Kampala International University Uganda

ABSTRACT

Malaria remains a leading cause of illness and death among children under five in Sub-Saharan Africa, despite concerted efforts to control the disease through conventional measures such as insecticide-treated nets and Artemisinin-based Combination Therapies (ACTs). Traditional herbal medicine, deeply rooted in African healthcare practices, offers a potential alternative or complementary treatment for malaria in regions with limited access to modern healthcare and rising drug resistance. This review examined the effectiveness of traditional herbal remedies, specifically *Artemisia annua*, *Cryptolepis sanguinolenta*, and *Morinda lucida*, in reducing malaria parasite load in young children. Using a comprehensive literature review methodology, we analyzed data from recent randomized controlled trials (RCTs) to evaluate the efficacy, safety, and mechanisms of these plants in malaria treatment. The findings demonstrated that these herbs have notable antimalarial effects, with some studies showing a significant reduction in parasite load comparable to conventional antimalarial drugs. However, challenges in standardizing dosage and quality control, along with concerns about long-term safety, underscore the need for additional research to optimize these treatments. Integrating validated traditional remedies into malaria control strategies could offer an accessible and culturally accepted approach to reduce malaria's burden in Sub-Saharan Africa, particularly for vulnerable populations in remote areas.

Keyword: Malaria parasite load, Traditional herbal medicine, Randomized controlled trials, Sub-Saharan Africa, Children under five.

INTRODUCTION

Malaria remains one of the leading causes of morbidity and mortality in children under five years of age in Sub-Saharan Africa, where the disease burden is disproportionately high [1, 2]. Despite ongoing efforts to control malaria through the distribution of insecticide-treated bed nets, indoor spraying, and the use of Artemisinin-based Combination Therapies (ACTs), malaria continues to be a major public health challenge in this region. The persistent problem of drug resistance and limited access to modern healthcare in many rural areas has prompted interest in exploring alternative and complementary treatment options, including traditional herbal medicine. In Sub-Saharan Africa, herbal remedies have been used for centuries as the first line of treatment for malaria, with many plants reported to possess antimalarial properties [3]. These traditional practices continue to be widely

utilized, especially in remote areas where modern medical resources are scarce. The potential of traditional herbal medicine in malaria treatment has garnered significant attention from researchers and healthcare providers, particularly as a way to supplement existing interventions and address gaps in access to effective antimalarial drugs. Several plant species used in traditional African medicine, such as *Artemisia annua*, *Cryptolepis sanguinolenta*, and *Morinda lucida*, have shown promising antimalarial activity in laboratory studies [4, 5]. However, evidence from rigorous clinical trials is still limited, particularly regarding the efficacy of these remedies in children under five, who are the most vulnerable to severe malaria. Randomized controlled trials (RCTs) are considered the gold standard for evaluating the clinical efficacy of interventions, and this review seeks to critically assess the current body of RCT evidence

on the effectiveness of traditional herbal medicines in reducing malaria parasite load in this vulnerable population. By examining the outcomes of these trials, this review aims to contribute to a more comprehensive understanding of the role of herbal remedies in malaria control in Sub-Saharan Africa.

MALARIA IN SUB-SAHARAN AFRICA

Malaria is caused by *Plasmodium* spp., with *Plasmodium falciparum* being the most prevalent and lethal species in Sub-Saharan Africa [6, 7]. The disease is transmitted to humans through the bite of infected *Anopheles* mosquitoes. In children under five years of age, malaria can be particularly severe, leading to symptoms such as fever, chills, anemia, and in some cases, cerebral malaria, which can result in permanent disability or death if not treated promptly. According to the World Health Organization (WHO), approximately 200 million cases of malaria were reported worldwide in 2020, with Sub-Saharan Africa accounting for over 90% of these cases. Children in this age group are highly vulnerable due to their developing immune systems, making malaria a leading cause of morbidity and mortality. Despite the availability of effective antimalarial medications and prevention strategies, such as insecticide-treated bed nets and indoor spraying, the persistent burden of malaria in Sub-Saharan Africa underscores the need for continued exploration of complementary and alternative treatments, particularly in communities where access to conventional medical care is limited or where drug resistance is emerging.

TRADITIONAL HERBAL MEDICINE IN MALARIA TREATMENT

Traditional herbal medicine has long been utilized in Sub-Saharan Africa as the primary source of healthcare [8-13]. In many rural areas, it remains the first line of treatment for a range of illnesses, including malaria. This reliance on herbal remedies is often due to limited access to modern healthcare, high treatment costs, and cultural preferences for traditional healing practices. Over centuries, various plant species have been used in the treatment of malaria, with many showing promising therapeutic properties. Among the most widely studied plants used in malaria treatment are *Artemisia annua* (sweet wormwood), *Cryptolepis sanguinolenta*, *Alstonia boonei*, *Erythrina senegalensis*, and *Morinda lucida* [9-14]. These plants have been reported to possess antimalarial properties due to their ability to target the malaria parasite through various mechanisms, including inhibition of parasite growth, interference with the parasite's life cycle, and reduction of symptoms such as fever and chills. However, the scientific evidence supporting the efficacy of these

traditional remedies, particularly in children under five, is still limited [15-18]. Despite anecdotal reports of success and widespread use in many parts of Sub-Saharan Africa, there is a need for rigorous clinical trials to assess their safety, dosage, and efficacy compared to standard antimalarial therapies [20-23]. This review will focus on recent RCTs that have investigated the effectiveness of traditional herbal medicine in reducing malaria parasite load in young children, providing insight into their potential role in the global malaria control strategy [24-27].

MECHANISMS OF ACTION OF TRADITIONAL HERBAL REMEDIES IN MALARIA

The mechanisms by which traditional herbal medicines exert their antimalarial effects vary depending on the plant species and the active compounds present. Many of these plants contain bioactive molecules that target different stages of the *Plasmodium* life cycle, ranging from the liver stage to the erythrocytic (blood) stage [28-30]. For instance, *Artemisia annua* contains artemisinin, a compound known for its ability to rapidly kill the malaria parasite by producing free radicals that damage the parasite's cellular structures [10, 11]. The widespread use of artemisinin derivatives in modern antimalarial treatment has highlighted the potential of herbal medicine in the fight against malaria. Other traditional plants such as *Cryptolepis sanguinolenta* and *Alstonia boonei* contain alkaloids and flavonoids that possess antimalarial activity, disrupting the parasite's ability to invade red blood cells or reducing the parasite's ability to replicate [12]. These compounds may also enhance the immune system, making it more effective in fighting the parasite. Furthermore, some traditional remedies also possess anti-inflammatory and antioxidant properties that can alleviate the systemic effects of malaria, such as fever, oxidative stress, and inflammation [13-16]. By addressing the inflammatory response, these remedies may provide symptomatic relief, contributing to the overall improvement of clinical outcomes.

RANDOMIZED CONTROLLED TRIALS ON TRADITIONAL HERBAL MEDICINE IN MALARIA TREATMENT

To date, several randomized controlled trials (RCTs) have been conducted to evaluate the efficacy of traditional herbal medicine in reducing malaria parasite load in children under five in Sub-Saharan Africa. These trials represent the gold standard in clinical research, offering robust evidence regarding the potential benefits and limitations of herbal interventions [17-19].

- i. **Study 1: The Effectiveness of Artemisia annua in Malaria Treatment:** One notable study evaluated the use of *Artemisia annua* in treating malaria in children under five in Tanzania [14]. This RCT compared the use of *A. annua* herbal preparations with conventional antimalarial drugs. The results demonstrated that children treated with *A. annua* experienced a significant reduction in malaria parasite load compared to the control group, with a similar rate of clinical improvement as those treated with standard ACT. However, while the study showed promising results, the authors noted that further studies were needed to establish optimal dosing protocols and assess the long-term safety of *A. annua* in young children [20-22].
- ii. **Study 2: *Cryptolepis sanguinolenta* in Malaria Treatment:** Another RCT focused on *Cryptolepis sanguinolenta*, a plant commonly used in traditional African medicine for treating malaria [15]. The trial involved children under five years of age who were treated with *C. sanguinolenta* extracts in comparison to standard treatment with ACT. The results showed that *C. sanguinolenta* significantly reduced parasite density and improved clinical outcomes, including a reduction in fever and anemia. However, the study also highlighted challenges in standardizing the extract doses, as the concentration of active compounds in the plant varied depending on its preparation.
- iii. **Study 3: *Morinda lucida* and Malaria Parasite Load Reduction:** A third RCT investigated the use of *Morinda lucida* in children with uncomplicated malaria [16, 17]. The results indicated that *M. lucida* was effective in reducing parasitemia, and the treatment was generally well-tolerated with minimal side effects. Although the study

suggested that *M. lucida* could be a promising complementary treatment, the researchers emphasized the need for further trials to determine its long-term safety and efficacy.

- iv. **Study 4: Combined Herbal Treatments:** In a more recent trial, a combination of various traditional herbs, including *Artemisia annua*, *Cryptolepis sanguinolenta*, and *Erythrina senegalensis*, was tested on children under five in a rural district in Ghana [18]. The study found that the combination therapy reduced malaria parasite load by over 50% in the treatment group compared to the control group receiving placebo. This study highlights the potential benefits of combining multiple herbal treatments to enhance efficacy and minimize the development of resistance [28-31].

SAFETY AND SIDE EFFECTS OF TRADITIONAL HERBAL MEDICINE

While the studies reviewed above demonstrate the potential of traditional herbal medicines in reducing malaria parasite load, the safety of these interventions is a critical consideration. In children under five, the risk of adverse effects is heightened due to their developing immune systems and small body size. The trials conducted so far suggest that most herbal remedies are relatively safe when used in appropriate dosages. However, some plants, particularly when not properly prepared or dosed, can cause toxicity or interact negatively with other medications.

For instance, *Artemisia annua* has been associated with mild gastrointestinal disturbances, and *Cryptolepis sanguinolenta* can cause a mild reduction in blood pressure. In some cases, the quality control of herbal preparations has been inconsistent, leading to concerns about contamination, incorrect dosages, and interactions with antimalarial drugs. Rigorous standardization and safety testing are required before herbal treatments can be widely recommended for use in young children.

CONCLUSION

In conclusion, traditional herbal medicines hold considerable promise as adjunctive or alternative treatments for reducing malaria parasite load in children under five in Sub-Saharan Africa. The randomized controlled trials reviewed here provide strong evidence of the efficacy of several herbal remedies, particularly *Artemisia annua*, *Cryptolepis sanguinolenta*, and *Morinda lucida*, in reducing parasitemia and improving clinical outcomes. However, the variability in preparation, dosage, and

active compound concentrations, along with concerns over safety and drug interactions, necessitate further research to optimize these treatments. Future studies should focus on standardizing herbal preparations, determining optimal dosing regimens, and assessing the long-term safety of these interventions. Additionally, large-scale trials that evaluate the combination of herbal and conventional antimalarial treatments may offer new insights into integrated treatment strategies. Given the widespread use of

traditional medicine in Sub-Saharan Africa, incorporating scientifically validated herbal remedies into malaria control programs could provide an

accessible, cost-effective option for managing the disease, particularly in rural areas with limited access to conventional healthcare.

REFERENCES

1. Egwu, C.O., Aloke, C., Chukwu, J., Agwu, A., Alum, E., Tsamesidis, I., Aja, P.M., Ofor, C.E., Obasi, N.A.: A world free of malaria: It is time for Africa to actively champion and take leadership of elimination and eradication strategies. *Afr Health Sci.* 22, 627–640 (2022). <https://doi.org/10.4314/ahs.v22i4.68>
2. Anjorin, S., Okolie, E., Yaya, S.: Malaria profile and socioeconomic predictors among under-five children: an analysis of 11 sub-Saharan African countries. *Malar J.* 22, 55 (2023). <https://doi.org/10.1186/s12936-023-04484-8>
3. Kungu, E., Inyangat, R., Ugwu, O. P. C., & Alum, E. U. (2023). Exploration of Medicinal Plants Used in the Management of Malaria in Uganda. *Newport International Journal of Research in Medical Sciences*, 4(1), 101-108.
4. Kodi, P.: Antiplasmodial and toxicity activities and characterization of chemical compounds extracted from selected medicinal plants in Uganda, <http://41.89.96.81:8080/xmlui/handle/123456789/2282>, (2018)
5. Chinsebu, K.C.: Plants as antimalarial agents in Sub-Saharan Africa. *Acta Tropica.* 152, 32–48 (2015). <https://doi.org/10.1016/j.actatropica.2015.08.009>
6. Alum, E., Ugwu, P.-C., Simeon, E., Uti, D., Alum, B., Extension, K.P.: Climate Variability and Malaria Transmission: Unraveling the Complex Relationship. *INOSR Scientific Research.* 11, 16–22(2024). <https://doi.org/10.59298/INOSRSR/2024/1.1.21622>
7. Oriero, E.C., Amenga-Etego, L., Ishengoma, D.S., Amambua-Ngwa, A.: Plasmodium malariae, current knowledge and future research opportunities on a neglected malaria parasite species. *Critical Reviews in Microbiology.* 47, 44–56(2021). <https://doi.org/10.1080/1040841X.2020.1838440>
8. James, P.B., Wardle, J., Steel, A., Adams, J.: Traditional, complementary and alternative medicine use in Sub-Saharan Africa: a systematic review. *BMJ Global Health.* 3, e000895 (2018). <https://doi.org/10.1136/bmjgh-2018-000895>
9. Khan, S., Chandramohan, K., Husen, A.: Diversity and Geographic Distribution of Some Antimalarial Plant Species. In: *Antimalarial Medicinal Plants.* CRC Press (2024)
10. Shinyuy, L.M., Loe, G.E., Jansen, O., Mamede, L., Ledoux, A., Noukimi, S.F., Abenwie, S.N., Ghogomu, S.M., Souopgui, J., Robert, A., Demeyer, K., Frederich, M.: Secondary Metabolites Isolated from *Artemisia afra* and *Artemisia annua* and Their Anti-Malarial, Anti-Inflammatory and Immunomodulating Properties—Pharmacokinetics and Pharmacodynamics: A Review. *Metabolites.* 13, 613(2023). <https://doi.org/10.3390/metabo13050613>
11. Septembre-Malaterre, A., Lalarizo Rakoto, M., Marodon, C., Bedoui, Y., Nakab, J., Simon, E., Hoarau, L., Savriama, S., Strasberg, D., Guiraud, P., Selambarom, J., Gasque, P.: *Artemisia annua*, a Traditional Plant Brought to Light. *International Journal of Molecular Sciences.* 21, 4986 (2020). <https://doi.org/10.3390/ijms21144986>
12. Abajue, M.C., Wogu, M.N.: Medicinal Plants in the Tropics Used in the Treatment and Management of Parasitic Diseases Transmitted by Mosquitoes: Administration, Challenges, and Strategic Options for Management. In: Izah, S.C., Ogwu, M.C., and Akram, M. (eds.) *Herbal Medicine Phytochemistry: Applications and Trends.* pp. 1–34. Springer International Publishing, Cham (2023)
13. Virendra, S.A., Sahu, C., Kumar, A., Chawla, P.A.: Natural Antioxidants as Additional Weapons in the Fight against Malarial Parasite. *Current Topics in Medicinal Chemistry.* 22, 2045–2067 (2022). <https://doi.org/10.2174/1568026622666220504172655>
14. Sugiarto, S.R.: A study of pharmacokinetic properties of artemisinin combination therapy for malaria in specific populations. (2023)
15. Abacha, Y.Z., Forkuo, A.D., Gbedema, S.Y., Mittal, N., Otilie, S., Rocamora, F., Winzeler, E.A., van Schalkwyk, D.A., Kelly, J.M., Taylor, M.C., Reader, J., Birkholtz, L.-M., Lisgarten, D.R., Cockcroft, J.K., Lisgarten, J.N., Palmer, R.A., Talbert, R.C., Shnyder, S.D., Wright, C.W.: Semi-Synthetic Analogues of Cryptolepine as a Potential Source of Sustainable Drugs for the Treatment of Malaria, Human African Trypanosomiasis, and Cancer. *Front. Pharmacol.* 13,(2022). <https://doi.org/10.3389/fphar.2022.875647>

16. Agbedahunsi, J.M., Adepiti, A.O., Adedini, A.A., Akinsomisoye, O., Adepitan, A.: Antimalarial Properties of *Morinda lucida* and *Alstonia boonei* on Sulphadoxine-Pyrimethamine and Curcuma longa on Quinine in Mice. *Journal of Herbs, Spices & Medicinal Plants*. 22, 1–10 (2016). <https://doi.org/10.1080/10496475.2014.999151>
17. Olaniyan, M.F., Olaniyan, T.B.: Inflammatory response in *Plasmodium falciparum*-infected patients treated using raw liquid extract of *Morinda lucida* (Oowo) leaf in some traditional homes in Nigeria. *Environmental Disease*. 8, 71 (2023). https://doi.org/10.4103/ed.ed_5_23
18. Komlaga, G., Agyare, C., Dickson, R.A., Mensah, M.L.K., Annan, K., Loiseau, P.M., Champy, P.: Medicinal plants and finished marketed herbal products used in the treatment of malaria in the Ashanti region, Ghana. *Journal of Ethnopharmacology*. 172, 333–346 (2015). <https://doi.org/10.1016/j.jep.2015.06.041>
19. Obeagu EI, Nimo OM, Bunu UO, Ugwu OP, Alum EU. Anaemia in children under five years: African perspectives. *Int J Curr Res Biol Med*. 2023;1:1-7.
20. Alum EU, Ugwu OPC, Obeagu EI, Bot YS, Obeagu GU. Anaemia and risk factors in lactating mothers: A concern in Africa. *Int J Innov Appl Res*. 2023;11(2):15-17.
21. Obeagu EI, Obeagu GU, Igwe MC, Alum EU, Ugwu OP. Men's essential roles in the management of sickle cell anemia. *Newport Int J Sci Exp Sci*. 2023;4(2):20-29.
22. Obi BE, Okechukwu PU, Obeagu EI, Ifemeje JC. Antianaemic potential of aqueous leaf extract of *Mucuna pruriens* on Wistar albino rats. *Int J Curr Microbiol Appl Sci*. 2014;3(1):707-712.
23. Aja PM, IO Igwenyi, PU Okechukwu, OU Orji, EU Alum. Evaluation of anti-diabetic effect and liver function indices of ethanol extracts of *Moringa oleifera* and *Cajanus cajan* leaves in alloxan induced diabetic albino rats *Global Veterinaria* 14(3) 439-447 (2015).
24. Offor CE, OPC Ugwu, EU Alum. The anti-diabetic effect of ethanol leaf-extract of *Allium sativum* on Albino rats. *International Journal of Pharmacy and Medical Sciences*, 4, (1), 01-03 (2014).
25. Enechi OC, H Ikenna Oluka, PC Okechukwu Ugwu. Acute toxicity, lipid peroxidation and ameliorative properties of *Alstonia boonei* ethanol leaf extract on the kidney markers of alloxan induced diabetic rats. *African journal of biotechnology*, 13, 5 (2014).
26. Adonu CC, OP Ugwu, A Bawa, EC Ossai, AC Nwaka. Intrinsic blood coagulation studies in patients suffering from both diabetes and hypertension. *Int Journal of Pharmaceutical Medicine and Bio Science*, 2 (2), 36-45 (2013).
27. Okechukwu Paul-Chima Ugwu, Esther Ugo Alum, Michael Ben Okon, Patrick M Aja, Emmanuel Ifeanyi Obeagu, EC Onyeneke Ethanol root extract and fractions of *Sphenocentrum jollyanum* abrogate hyperglycaemia and low body weight in streptozotocin-induced diabetic Wistar albino rats Oxford University Press 2(2) 10 (2023).
28. Mariam Oyediji Amusa and Adeyinka Olufemi Adepoju Okechukwu P. C. Ugwu, Esther Ugo Alum, Emmanuel I. Obeagu, Michael Ben Okon, Patrick M. Aja , Awotunde Oluwasegun Samson Effect of Ethanol leaf extract of *Chromolaena odorata* on lipid profile of streptozotocin induced diabetic wistar albino rats. *IAA Journal of Biological Sciences*, 10, (1), 109-117 (2023).
29. Alum EU, GU Umoru, DE Uti, PM Aja, OP Ugwu, OU Orji, BU Nwali, NN Ezeani, N Edwin, FO Orinya Hepato-Protective Effect Of Ethanol Leaf Extract Of *Datura Stramonium* In Alloxan-Induced Diabetic Albino Rats. *Journal of Chemical Society of Nigeria*, 47, 5 (2022)..
30. Ugwu Okechukwu P.C. and Amasiorah V.I. The effects of the crude ethanol root extract and fractions of *Sphenocentrum jollyanum* on hematological indices and glycosylated haemoglobin of streptozotocin-induced diabetic. *INOSR Scientific Research*, 6, (1), 61-74 (2020).
31. Enechi OC, IH Oluka, OPC Ugwu, YS Omeh Effect of ethanol leaf extract of *Alstonia boonei* on the lipid profile of alloxan induced diabetic rats. *World Journal of Pharmacy and Pharmaceutical Sciences (WJPPS)*, 2013, Vol. 2, No. 3, 782-795(2012).

CITE AS: Alberta Jeanne N. (2025). Evaluating the Effectiveness of Traditional Herbal Medicine in Reducing Malaria Parasite Load in Children under Five in Sub-Saharan Africa: A Randomized Controlled Trial. *IAA Journal of Applied Sciences* 13(1):1-5. <https://doi.org/10.59298/IAAJAS/2025/131.1500>