



Traditional Vs. Modern Medicine: A Comparative Study on Malaria Treatments

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ABSTRACT

Malaria remains a significant global health challenge, disproportionately impacting populations in endemic regions. This study examines and compares traditional and modern approaches to malaria treatment, emphasizing their historical development, efficacy, and limitations. Traditional medicine, deeply rooted in cultural practices, often employs herbal remedies and indigenous knowledge to treat symptoms. Modern medicine, on the other hand, is characterized by scientifically developed pharmaceuticals such as Artemisinin-based Combination Therapies (ACTs). Through a review of literature and case studies, this paper highlights the complementary potentials of these two approaches while addressing the challenges posed by drug resistance, limited accessibility, and inadequate integration of traditional practices into contemporary healthcare frameworks. The findings advocate for an integrated approach that leverages the strengths of both systems to enhance malaria treatment strategies and improve health outcomes in affected communities.

Keywords: Malaria, Traditional medicine, Modern medicine, Artemisinin-based combination therapies (ACTs), Drug resistance.

INTRODUCTION

The recent upsurge in focusing on herbal and plant medicines has evolved our interest in presenting a comparative study on traditional and modern approaches to treat malaria. Since ancient times, herbal medicines have been exploited for the management of numerous protozoal infections. They are deemed to have lesser toxic effects in comparison with conventional synthetic molecules. In this tutorial paper, our focus was to statistically compare the responses of valid papers supporting the aforementioned arguments under consideration [1, 2]. According to the WHO, 3.3 billion people live in areas at risk of malaria transmission in 106 countries and territories. Each year, this leads to about 216 million malaria cases and an estimated 655,000 deaths. In 2010, an estimated 91% of malaria deaths in Africa were attributed to *P. falciparum*, the main parasite causing malaria in sub-Saharan Africa. Generally, malaria is either treated through the use of antimalarial drugs or through traditional herbal therapy where it is endemic. The present paper is a modest attempt to review and provide an elaborate and rigorous tool in the formulation of anti-malarial therapies from both traditional herbal and modern clinical perspectives. Additionally, it will also highlight the potentials and limitations between the two systems of drug formation strategies in the pharmacological treatment of malaria, which is rapidly becoming a re-emerging epidemic [3, 4].

Historical Overview of Malaria Treatments

In the history of tropical medicine, many treatments have been used against malarial diseases all over the world and throughout the centuries. Best documented probably are the quinine treatments developed in the West in the course of the 19th century. Apart from these, a wide range of traditional remedies against malarial fevers has been employed in many endemic areas of sub-Saharan Africa, South America, and Southeast Asia. The traditional remedies have often been considered useless, harmful, or at best uncertain, but feature exotic methods from the viewpoints of culturally distant medical traditions and may offer inspiration for new treatments. Traditional medicines are shaped by local knowledge of the properties and

efficacies of the surrounding flora, and the importance of empirical observation and experiment in their development has been emphasized. The use of the same plants or remedies based on the same principles over time also shows the continued relevance of given remedies in the light of contemporary understanding. At the same time, however, the understanding of malaria has, of course, changed alongside and sometimes because of the changing river sampling of medical treatment. Hence, historical research can enrich the picture of antimalarial traditional medicine not in the least by extending current antimalarial drug research and development in the West beyond standardized plant remedy extraction [5, 6].

Traditional Medicine

In 2019, the world's malaria cases reached 229 million, one million more than those reported in 2018. In 2018, there were 27 tests, and in 2019, over 300 tests gazetted. With the rise of new diseases, alternative medical methods, which are more accessible and cheaper, can help to address healthcare problems in developing countries, especially for noncommunicable diseases (NCDs) including mental health conditions and infectious diseases such as malaria. Traditional medicine might have the potential to offer a solution. In this part, an overview of traditional medicine is provided for a better understanding of the whole concept. A brief research topic introduction on traditional medicine as an alternative cure for malaria is proposed [7, 8].

Traditional medicine: Traditional medicine is known as indigenous, unorthodox, natural, or alternative medicine due to utilizing a natural approach. It encompasses a variety of belief systems, approaches, and practices that are transmitted from generation to generation by communities and between people. Indigenous remedies for use in the treatment of malaria have been known for centuries. Traditional therapies have been used for malaria or for symptom relief by many communities around the world. Often, simple teas and decoctions from dried herbs were used. Plants were often the main source of therapeutic compounds, but animal parts and minerals were sometimes also included in folk remedies. Local people, depending on the geographical location, the ecosystem, and the altitude, applied different remedies for managing the symptoms of malaria. Infections could be treated, for example, with the juice from the leaves, stems, and bark of plants, inhalations of fumigations prepared by cooking different plants, drinking infusions of plants, or smoking treatments such as drinking blood of freshly slaughtered animals or using meat as poultices on the chest, abdomen, and temples, among different people. Some traditional formulations generated cures; others given metabolic support or the management of pain were empirically created. Snake venom, for example, is administered to delirious malaria patients in Burkina Faso. It is believed to clear the mind and bring back consciousness. The Tandroy people of the Androy region, Madagascar, use a mixture of watermelons, papayas, and seeds to reduce a fever. Treatment for cerebral malaria involving many kinds of complications and symptoms referred to *umqumbothi* in South Africa is utilized by the Zulus. Since a primitive healthcare system treatment was focused on “a panacea” for all symptoms, most prescribing habits were based on the accompanying clinical symptoms, typically pain relief, antipyretics (to lower fevers), and appetite stimulants [9, 10].

Scientific Basis of Modern Malaria Treatments

The present approaches to treating malaria are rooted in robust scientific understandings of the disease. Modern malaria treatments have developed over a period of time through scientific research, clinical trials, and health promotions aimed at saving lives from malaria. Artemisinin-based combination therapies (ACTs), which are administered through pharmaceuticals, are currently the recommended treatments to treat severe and uncomplicated malaria in the majority of countries. These work by rapidly reducing the number of malaria parasites in the body and by causing a different type of death to the parasites than happened in the past with other classes of antimalarial drugs. ACTs don't necessarily clear all of the parasites from the body. However, by rapidly reducing the number of parasites in the body, symptoms are reduced, and people are less likely to infect mosquitoes, so others don't get infected. In addition to ACTs, a number of various other classes of pharmaceuticals are available to help fight drug-resistant malaria infections as well. In the event that the symptoms have occurred due to another illness, correct treatments should be sought from qualified health facilities [11, 12]. To improve the effectiveness of antimalarial treatments, policymakers, funding agencies, and researchers endorse technological and drug formulation advancements. In anticipation of increased resistance in the coming years, investments in new formulations and delivery systems of ACTs are noted. Innovations in production, development, and strategies for implementation are ongoing. These include ACTs with preventive potential, inventions to reduce malaria transmission, and only treat a subset of the population. Resistance decreases the

effectiveness of current tools to treat malaria but is likely a temporary condition given the robustness of the collective array of public health and scientific tools. Current tools to treat malaria build on the past, in which there were individual and regional resistances that subsequently abated [13, 14].

Antimalarial Drugs

Malaria parasites are becoming resistant to most cost-affordable drugs, such as SP and CQ, for treatment and IPTp/PQ. These drug resistances are responsible for changing treatment strategies. Modern approaches are focused on the rapid killing of asexual and gametocyte stages of *P. falciparum*. Ferroquine is a 4-aminoquinoline with rapid killing and a long post-treatment prophylactic effect (approximately 3 weeks). This approach leads to a higher proportion of parasitized red blood cells and may be dangerous in non-immune individuals. The discovery and pharmacological profile of this modern antimalarial drug-resistant treatment will be reviewed. Artemisinin-based combination therapies are currently used as a first-line therapy for malaria. The drug has rapid activity against blood-stage malaria parasites, which plays a significant role in resolving the symptoms. Artemisinin is highly active against the asexual blood stages of human malaria parasites with a rapid onset, reducing parasitemia time beyond the previous 'rapid' drugs, and is currently used in artemisinin-based combination therapies against drug-resistant strains of malaria [15, 16]. Artemisinin, together with any of its derivatives, is safe, well-tolerated, and the ACT component drugs are effective against asexual blood stages as well as a fraction of gametocyte stages of *P. falciparum*, the most fatal global malariogenic agent. Artemisinin can be categorized into artemisinin derivatives and partner drugs. Artemisinin derivatives include arteether, dihydroartemisinin, artemether, and artesunate. In contrast, the partner drugs include lumefantrine, piperaquine, mefloquine, naphthoquine, amodiaquine, and sulfadoxine plus pyrimethamine. However, artemisinin resistance is also emerging in *P. falciparum*. Artemisinin resistance has been observed first on the Cambodia-Thai border and then in some southern provinces of the Lao People's Democratic Republic, the Tanintharyi region of Myanmar, and the Barisal and Chittagong Divisions of Bangladesh. It has genes identified to date associated with verified K13 propeller mutants in Cambodia. The efficacy of artemisinin-based combination therapy was tested on patients with *P. falciparum* [17, 18].

Effectiveness and Efficacy Comparison

In Cambodia, a 6-month-long small-scale ethnographic study was carried out to identify the most common traditional and modern treatments for malaria in one remote rural village in malaria holoendemic Mondolkiri. The qualitative data from this study, with an emphasis on the importance and cost of malaria treatments, are presented elsewhere. This village of approximately 1,100 Phong, a minority ethnic group, temporarily swells with Khmer labor and military personnel seeking their fortune in the lucrative timber industry. It is also inside a national park, and it is illegal for any large-scale commercial activities to take place in this area. The nearest health infrastructure is about a 2-day drive away over extremely poor roads. A Hb blood smear microscopy service, as part of the Active Case Detection program for persons taking anti-malarials from local unqualified providers, is conducted on a monthly basis in a health center about a 1-day drive away. In this culture and in this study, 'traditional' medicine was defined as one or any of: 1) self-treatment (with healers only available for severe cases), 2) treatment by ethnic (non-Khmer) healers, and 3) treatment by practitioners of the malevolent arts offering cannabis weed 'magic' (along with other drugs and potions) as a loss-of-profit treating tactic. The extent of dual (both western and traditional) treatment seeking is discussed. Microscopy was carried out by a clinic assistant initially trained at a workshop [19, 20]. In Sri Lanka, the effectiveness of traditional practitioners was evaluated in a naturalistic comparison in a stable malaria hypoendemic area in the North Central Province. The study was limited to *P. vivax* malaria, the species that causes most problems here, especially due to repeated relapses. Local doctors at malaria clinics in the major hospitals in Anuradhapura and Mihinthale were asked to refer *P. vivax* cases to a general practitioner in one of two comparison sites. The North Central Province has good health infrastructure, including hospitals, a good easily traversable road network, and easy access to diagnosis and anti-malarial treatment for all its inhabitants. Non-modifiable factors, such as rainfall, were controlled by utilizing only the patients with confirmed primary attacks who appeared at the clinics in the period of the high annual 'Twindemic' during the first week of October from 1997-2000, the recruitment period of the comparative study undertaken from 2005-2009. No significant difference within two weeks in the development of a second or subsequent post-treatment week between the two treatment groups was detected, except with artemisinin, reflecting a possible anti-relapse activity. More recent research has shown that local relapse

strains have increased proportions of gene mutations that lead to earlier glycolytic instead of microgametocyte developmental arrest, increasing the risk of relapses [21, 22, 23, 24].

Challenges and Future Directions

The expanding availability of ACT has reduced the prevalence of chloroquine-resistant malaria, but drug resistance remains an ongoing threat. Though a rapid diagnostic expands malaria care and prevention, many people living in hard-to-reach areas do not have access to a health facility with malaria diagnostics [25, 26, 27]. This lack of access to appropriate care, both due to distance to a health facility and the unavailability of ACT, leads to reliance on alternative care methods, including traditional healers. Despite traditional medicine's prevailing popularity, there are few studies that integrate traditional treatments and practices with mainstream medical approaches. A possible way of integrating traditional medicine into modern medicine would be to provide the necessary education, training, resources, and facilities to the traditional healers to upgrade their methods, effective formulation, quality control procedures, and understanding of the biological cause of malarial fever [28, 29, 30]. However, issues of drug regulation and resistant malaria strains prevent many African countries from investing in traditional medicine. Finding a treatment based on traditional medicine in Uganda would be a sustainable method because it would be readily acceptable and affordable to the rural poor. Future research should evaluate community preference for herbal and/or modern medicines, identify plants used in traditional medicine that are effective against the malarial parasite, evaluate the effectiveness of traditional treatments in laboratory and field conditions, identify the methods used by traditional healers for isolation of the active components from the plant, and evaluate the side effects of the whole plant extract and active components isolated. Assessment of the effectiveness of traditional versus modern medicine in long-term and short-term interventions will provide evidence for a combined approach to malaria disease control and management [30, 31, 32, 33, 34].

CONCLUSION

The comparative analysis of traditional and modern malaria treatments underscores the potential of integrating both approaches to combat malaria effectively. While modern medicine offers scientifically validated solutions like ACTs to address the disease's acute phases and drug-resistant strains, traditional practices contribute accessible, culturally accepted, and often cost-effective remedies. However, challenges such as inadequate regulation, resistance to ACTs, and limited scientific validation of traditional remedies highlight the need for collaborative research and policy development. Future efforts should focus on validating traditional methods, promoting sustainable plant-based treatments, and fostering education for traditional healers. A combined framework has the potential to bridge gaps in accessibility and efficacy, offering a holistic solution to this pervasive health issue.

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