

## Some Antimalarial Plants of Tribal Regions of M.P.

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**Abstract:** Malaria is a serious parasitic disease from tropical regions caused by a species of plasmodium and transmitted by female anopheles mosquito. It is prevalent in approximately 100 countries in Africa, southeast Asia and South America, where approximately 2.4 million people are at risk. According to World Malarial Report (WHO 2014), there were approximately 250 million malaria cases and near about 1 million people die each year due to malaria. It is also a serious disease in some states of India, such as M.P. So the need for an alternative drug for malaria initiated intensive efforts for developing new antimalarial drug from indigenous plants. The information from different tribal communities of M.P. along with journals and documents of different universities and institutes of M.P. were collected for information on botanical therapies and plant species used for malaria.

100 plant species belonging to 40 families are used by the people of India for the treatment of malaria. 27 plant species have been reported in M.P. The species reported to be used for the treatment of malaria and brain fever were either found around the vicinity of their habitation or in the forest area of M.P. The most frequently used plant parts were leaves (35%), roots (30%), bark and whole plant (12%). The present study has compiled and enlisted the antimalarial plants of M.P.

**Key words-** Malaria, Disease, Parasitic, Medicinal Plants.

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### I. Introduction

Malaria is caused by single-celled protozoan parasites called plasmodium and transmitted to man through the Anopheles mosquito. It is one of the major fatal diseases in the world, especially in the tropics, and is endemic in some 102 countries, with more than half of the world population at risk with fatality rates being extremely high among young children below 5 years of age. The World Health Organisation estimates that there are between 300 and 500 million new cases of malaria worldwide, every year, mostly in Africa, Asia, South Pacific islands and South America, which causes at least 1 million deaths annually. In spite of control programs in many countries, there has been very little improvement in the control of malaria, and infections can reduce the effectiveness of labor and can lead to both economic and human losses. Control of malaria is complex because of the appearance of drug-resistant strains of Plasmodium and with the discovery that man becomes infested with species of simian malaria. At the same time, the Anopheles mosquito have developed resistance to many insecticides.

Spread of multidrug-resistant strains of Plasmodium and the adverse side effects of the existing antimalarial drugs have necessitated the search for novel, well-tolerated and more efficient antimalarial drugs that kill either the vector or the parasite. The use of plant-derived drugs for the treatment of malaria has a long and successful tradition. The first antimalarial drug was quinine, isolated from the bark of cinchona species in 1820. It is one of the oldest and most important antimalarial drugs, which is still used today. In 1940, another antimalarial drug, chloroquine, was synthesised and is being used in the treatment of malaria. Unfortunately, after an early success, the malarial parasite, especially plasmodium falciparum, also became resistant to chloroquine. Treatment of chloroquine-resistant malaria was done with alternative drugs or drug combinations, which were rather expensive and sometimes toxic. The extract of the bark and leaves of *Azadirachta indica* has also been used in Thailand and Nigeria as an antimalarial for a long time. Charaka in 300 BC and Susruta in 200 BC reported the antimalarial and antipyretic activity of this species. Hence, it is clear that the main drugs developed for malaria and used till now were discovered based on traditional use and ethnomedical data.

In Ghana, several plant species including *Az. Indica* A. Juss. (Meliaceae), *Cryptolepis sanguinolenta* (Lindl) Schtr. (Asclepidaceae), *Nauclea latifolia* Sm. (Rubiaceae), *Ocimum viride* Willd. (Lamiaceae), *Alstonia boonei* De Willd (Apocynaceae), *Morinda lucida* Benth. (Rubiaceae), *Nyctanthes arbour-tristis* L. (Nyctaginaceae) and *Tinospora cordifolia* (Willd.) Miens ex Hook f. And Thomas are used in treatment of malaria. In India six plant species, namely *Alstonia scholaris*, *Coptisteeta crotolaria*, *Occulta*, *Ocimum sanctum*, *Polygala persicariaefolia*, *Vitex peduncularis* have been reported by workers from different parts of north east India.

The list of antimalarial plants of India has not yet been completely searched out and it is an urgent need to compile this data. The aim of this study was to compile the antimalarial plants reported by different workers from India. The present database of antimalarial plants would help the future phytochemist to evaluate the best antimalarial plants and it would be possible to formulate the most effective medicine from this region of the world. It might, therefore, be useful to test the antimalarial, antiviral and anti-inflammatory activities of these groups of plants. The present survey has provided information about the range of species of plants used in the treatment of malaria in M.P. India. Accordingly, researchers should consider the ethnomedical information of all species before deciding which kind of screening should be used in the search for an antimalarial.

## II. Materials And Methods

All primary ethnobotanical studies from books and journals, research papers of different universities and institutes of India were collected for information about botanical therapies and plant species used for malaria. Local traditional healers were interacted with for confirmation and validation as far as possible. Any data or references to plants used for malaria were carefully inserted into a template and botanical name were re-examined and confirmed with the flora of India. For compliance of study, authors had interaction with traditional healers through interviews in the prominent communities.

## III. Results And Discussion

After thorough literature survey using the above method, it can be confirmed that 26 species of plants belonging to 14 families are used by the people of M.P. for the treatment of malaria. Of the 14 families studied, Verbenaceae, asteraceae, Rutaceae, Lamiaceae and Euphorbiaceae are predominant in terms of the number of species used to treat malaria. The species reported to be used for the treatment of malaria were either found around the vicinity of their habitation and in the forest area of M.P. The author has reported antimalarial plants from different parts of M.P. the plants recorded in this survey were used traditionally for the treatment of malaria and its symptoms. Majority of the plants were used as decoctions and some plants were used both internally and externally. Herbs and shrubs were found to be predominantly used as antimalarial drugs, and the most frequently used plant parts were leaves, roots and bark and whole plant. The enormous frequency of the usage of leaves in traditional preparations is related to their abundant availability and easy collection.

Information from the traditional healers of Assam Ayurveda Regional Research Institute, Itanagar, revealed that they had used pills of Kalmegh (*Andrographis paniculata*), stem bark of Latakaranja (*Caesalpinia crista*) and Guduchi (*T. Cordifolia*). Some species like *Holoptelea integrifolia* Planch, *T.cordifolia* (Willd.) *Calotropis procera* (Ait.) R. Br., *Nerium indicum* Mill., *Ajuga bracteosa* Wall., *Leucas cephalotes* Spreng., *Encostemma hyssopifolium* (Wild.) Verdoorn, *Vernonia cinerea* Less. *Justicia adhatoda* Linn., *Orthosiphon pallidus* Poyle ex Benth., *Pongamia pinnata* (L.) Merr., *Nyctanthes arboristis* L., *Calotropis gigantea* (L.) R.Br., *Capsium annuum* L., *Phyllanthus fraternus* L., *Plectranthus* sp., *Elephantopus scaber* Linn., *Combretum decandrum* Roxb. *Holarrhena antidysenterica* Wall., *Cleome viscosa* L., *Vernonia roxburgii* Less., *Achyranthus aspera* L. are also available in northeast India, but any report on their use in any part of northeast India has not yet been published [7-9].

The knowledge of plants used in the treatment of malaria in M.P. combined with the high level of correlation found with the uses of these plants in diverse parts of India, indicates the inheritance of our ancestral knowledge throughout the country. It represents sometimes the only available alternative malarial treatment in remote communities. Species like *Homalomena aromatica*, *Ocimum gratissimum*, *Elsholtzia blanda*, *Eucalyptus globulesare* used as mosquito repellents, whether these plants are repellants or insecticides or both has not yet been sufficiently proved. Local people of this region used these plants as a substitute for DDT and other insecticides, as it is well known that DDT and other insecticides have adverse effects on environment and human health. Several classes of the secondary plant metabolites are responsible for antimalarial activity, but the most important and diverse biopotency has been observed in alkaloids, quassinoids and sesquiterpene lactones. The active compounds isolated from antimalarial plants have been compiled from the review work of Saxena and others. Plants which produce different antimalarial compounds, namely, alkaloids, quassinoids, sesquiterpene, triterpenoids, flavonoids, etc. Can be very important sources of antimalarial drugs. These compounds have low, moderate or high in vitro antiplasmodial activity, whereas some of them are inactive. They also gave a critical account of crude extracts, essential oils and active constituents with diverse chemical structure from higher plants possessing significant antimicrobial activity.

In the information obtained, also, there were many details about the appropriate indication of each plant. For example, some plants are indicated to increase other potency. There are also plants that are traditionally employed for specific symptoms or conditions that often accompany malaria, such as weakness, renal failure, body pain or cerebral malaria. Many plants that have been considered to lack activity against malaria due to absence of in vitro activity

against plasmodium can have other mechanisms of action. Some authors have underestimated the traditional plants used for malaria based exclusively on low activity against plasmodium in vitro or in animal models. This can be a mistake of strategy or even methodology. There are many explanations for the absence of in vitro activity of an effective antimalarial drug. As an example, the active principle could be formed by hepatic metabolism or as a result of transformation by gut bacteria. Other possible mechanisms of action include immunomodulation or interference with the invasion of new red blood cells by parasites, which can be species specific. Therefore, studies in human subjects, as well as the observance of ethnomedical detailed data, are required in order to exclude or confirm the activity of plants traditionally used to treat malaria.

Sixty-eight plants have been reported to act against malaria, either to kill plasmodium sp. (eg. *Al. scholaris*, *O. sanctum*) or to act as hepatic protector if used in combination with some other plants like *An. paniculata*, *Co. teeta* or *Swertia chirayita*. This needs thorough screening by testing for active principles, toxicity of the extract and their pharmacological action to act against Plasmodium as well as hepatic protection [10]. Therefore it is required to carry out all possible studies on the selection basis of plants for strengthening and establishing them as a real drug before undertaking clinical trials. The plants which are commonly reported by different authors from different parts of M.P. such as *Al. scholaris*, *Co. teeta*, *Cr. occulta*, *O. sanctum*, *P. persicariaefolia*, *V. peduncularis*, should be given the priority for in vitro and in vivo studies.

There is a need to generate reliable scientific data to determine whether the plants currently used to treat malaria are actually effective. In the long term, this should help to prevent deaths due to ignorance and the misuse of plants for self-medication in the absence of advice from a qualified medical professional. Individual plants are rarely used alone. In most cases, they are used as mixtures like *Al. scholaris* with *An. paniculata* and *Artemisia nilagarica* with *Co. teeta* and *V. peduncularis* with *An. Paniculata* etc. It will never be easy to determine which plants are likely to be the most useful and should be examined to isolate pure active compounds. Some antimalarial plants are used for preparing baths or for inhalations (aromatic plants). It might, therefore, be useful to test the antibacterial, antiviral and anti-inflammatory activities of these groups of plants.

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**Table:** Some antimalarial plants of tribal region of M.P.

Plant Species	Family	Plasmodium sp.
Acacia clavigera	Leguminosae	Plasmodium
Acacia polyacantha	Mimosaceae	Plasmodium
Achyranthesa sapera	Amaranthaceae	Plasmodium
Albizia anthelmintica	Leguminosae	Plasmodium
Annona muricata	Annonaceae	Plasmodium
Artemisia maritima	Asteraceae	Plasmodium
Atlantia monophyla	Rutaceae	Plasmodium
Azadirachta indica	Meliaceae	Plasmodium
Azadirachta indica	Meliaceae	Plasmodium
Bridella cathartica	Euphorbiaceae	Plasmodium
Clerodendrum myricoides	Verbenaceae	Plasmodium
Cucumis aculeatus	Cucurbitaceae	Plasmodium
Jatropha gossypifolia	Euphorbiaceae	Plasmodium
Lagenaria sphaerica	Cucurbitaceae	Plasmodium
Lantana camara	Verbanaceae	Plasmodium
Luffa aegyptiaca	Cucurbitaceae	Plasmodium
Momordica charantia	Cucurbitaceae	Plasmodium
Nyctanthes orbortristris	Nyctaginaceae	Plasmodium
Oscimum sanctum	Lamiaceae	Plasmodium
Pongamia pinnata	Leguminosae	Plasmodium
Psidium guajava	Myrtaceae	Plasmodium
Tamarandus	Caesalpineae	Plasmodium
Tamarandus indica	caesalpineaceae	Plasmodium
Terminalia spinosa	Combretaceae	Plasmodium
Vernonia colorata	Asteraceae	Plasmodium
Xanthium strumarium	Asteraceae	Plasmodium