



# A REVIEW ON: ANTIMALARIAL HERBAL DRUG

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## **Abstract:**

The investigation of herbal medicine as an alternative has been rekindled due to the development of resistance of malaria parasites to traditional antimalarial medications. Researchers have also been motivated to validate the effects of herb-drug interactions due to the rise in the usage of herbal antimalarial therapies in combination with traditional antimalarial medications (both synthetic and semi-synthetic). This review assessed the results of combining herbal antimalarial medications with traditional antimalarial medications. Utilizing electronic databases, In tropical nations, malaria is a common infectious disease. Major antimalarial medications for a long time were made of natural ingredients, but since the 1930s, a number of synthetic medications have largely replaced these natural ones. This article attempts to succinctly demonstrate how several plants that were once used to treat malaria have returned as useful products due to a lack of synthetic medications. It also makes an attempt to describe certain tests that can be used to gauge the antimalarial effectiveness of plant extracts. The most prevalent parasite disease in the world is still malaria. The artemisinin and quinine compounds that are used to treat malaria have been a part of traditional medicine for thousands of years. Traditional medicine has developed into a significant and sustainable source of malaria treatment in endemic areas because to the rising levels of drug resistance, the expensive expense of artemisinin-based combination therapies, and the prevalence of fake antimalarial medications. Herbal remedies that are thought to have medicinal characteristics are being used more frequently. Patients typically use these treatments on their own initiative and without a doctor's prescription. Herbal medicines provide the greatest risk of adverse effects, thus the discovery and usage of natural chemicals necessitate a thorough examination of their safety and efficacy before their release onto the market. Nevertheless, due to the wide variety of their natural constituents, which frequently have specialised biological functions, natural products have been a significant source of novel medications. In this chapter, we examine the outcomes of using

extracts, fractions, and compounds with antimalarial activity that are derived from natural sources. We also offer a comprehensive overview of the most recent studies on the difficulties and approaches encountered in modern natural antimalarial drug discovery.

**Key Words: Antimalarial plants, Malaria, Natural Products**

## **1. Introduction:**

The obstacles caused by malaria

Plasmodium falciparum (P. falciparum), Plasmodium vivax, Plasmodium malariae, and Plasmodium ovale are the four main species of Plasmodium that cause malaria. P. falciparum is still the most dangerous of these species [1]. Malaria causes high rates of mortality and morbidity in sub-Saharan Africa, Asia, and Latin America [2]. Approximately 1.2 billion individuals are at high risk of contracting malaria each year, out of the 3 billion people who are projected to be exposed to it [3]. According to recent figures, malaria continues to be the most common disease in tropical areas, with more than 219 million symptomatic cases and 435,000 expected deaths. Pregnant women and children under five are the most vulnerable demographics, with Africa having the greatest rates of both cases and deaths [4, 5]. According to estimates by Phillipson and O'Neill (1987), 400 million people reside in nations where malaria is endemic, and 1,600 million people live in areas where they may be exposed to the disease. [6] It was estimated that 215 million persons worldwide had a chronic infection in 1982 and that 150 million new cases were reported annually. The four species of Plasmodium, P. falciparum, P. malariae, P. ovale, and P. vivax, are the primary culprits. Although the last three species are less harmful than P. falciparum, they nonetheless remain in the liver and can cause relapses several years after the first infection. The life-threatening malignant tertiary form of malaria, however, is caused by P. falciparum. [7]. Without a doubt, the most widely used antimalarial medications in Africa are derivatives of quinoline (QN). Quinine, amodiaquine, piperaquine, primaquine, pyronaridine, ferroquine, isopyroquine, tertbutylisopyroquine, mefloquine, tafenoquine, and chloroquine are a few examples of quinoline antimalarial medications. The most widely utilised antimalarial pharmacophore in the past century is 4-aminoquinoline. Recent Artemisinin-based Combination Therapy (ACT) regimens have included QN derivatives as a crucial component [8]. Due to the usage of Artemisia annua L., the discovery of ACT may be regarded as the most significant accomplishment of ethnopharmacological research in the 20<sup>th</sup> century [9]. (Asteraceae) Due to the drug's success in treating all malarial parasites, quinine-based medications are now prohibited throughout Africa. However, despite the overwhelming successes of ACT, worries about the potential effectiveness of artemisinin have recently increased.

## 2. Using natural malaria preventatives

There are considerable variations in the percentage of patients who use traditional herbal treatments for malaria. We conducted a meta-analysis of 28 research on treatment seeking behaviour, and the results revealed that 307 of 315 458 respondents used these treatments. The overall percentage was 20%, however due to the broad range—from 0% to 75%—this number is deceptive. The usage of traditional medicines to treat malaria is influenced by a variety of circumstances (see box).

## 3. Evaluation of plant Extracts for Antimalarial activity

Only recently have reliable in vitro testing for antimalarial activity been developed. Even for first screening, though, previous costly and time-consuming in vivo testing is still necessary. Phillipson and O'Neill reported on the largest published study for the evaluation of plant extracts (Phillipson and O'Neill, 1987) [10]. About 600 plants from about 126 families were extracted, and their extracts were examined for their in vitro effectiveness against *P. chatemerium* and *P. lophurae* in ducklings and *P. gallinaceum* in chickens.

## 4. Species of plants

A database currently lists 1277 plant species from 160 families that are used to cure malaria and fever (figure). The database still needs to incorporate more studies. For 428 of the listed plants, Table 1 displays the number of species in each IVmal category. In the publications reviewed, 849 species were mentioned just once; as a result, there is not enough data to compute an IVmal; it must be 3 or less.

**Table: 1**

Iv Mal	Number of species	Definition Of Iv According To Frequency Of Report
1	849	Insufficient Data
2.	95	Once in one ethnobotanical survey
3.	30	Twice in one community
4.	6	At least three times in one community
5.	42	More than one community
6.	91	More than one survey, in same country
7.	106	More than one country, in same continent



In Africa, Asia, and Latin America, Kalanchoe pinnata leaf preparations are used to treat fever and malaria.

### **5. Methodology:**

Geographical Description of the Study Region .The study area consists of four states: Kwara (Omu Aran), Oyo(Ado Ekiti), Ekiti (Ogbomoso), and Ogun (Sagamu) in Location of Nigeria: 8°08'N (5°06'E), 8°08'N (4°15'E),7°37'16"N (5°6'50"N (3°39'E) and 13'17"E) respectively.Locations of the study areas span two significant geopolitical Zones, namely Ogbomoso, Omu Aran (North central),Nigeria's southwest includes Sagamu and Ado Ekiti .Yorubas make up the majority of the population.According to a MIS report, the research region is located in the state of Nigeria with the highest frequency of malaria.

Typical Plant Life in the Study Area. Ado Ekiti and Sagamu are located in a rain forest environment with temperatures ranging from 21 to 28 degrees Celsius, considerable humidity, and two separate There are two seasons: a wet one from April through October and a dry one.A mean annual rainfall of from November through March1320 mm. In the savanna, Ogbomoso and Omu Aran fall.Region with temperatures ranging from 21° to 33°C with Between April and October there will be a lot of rain.With a mean annual rainfall of 1885 mm, high (51.1%).The abundance of evergreen plants on research locations is astounding, and this Encourages using local herbs to prevent sickness and Cure.

### **6. Clinical effectiveness and safety of herbal remedies**

There have been 18 case studies on natural antimalarials. Seventeen of the cohort studies that mentioned herbal remedies were for falciparum malaria, twelve were for vivax malaria, and five were for malaria of an unknown species. Details of 10 controlled studies of herbal remedies for uncomplicated malaria are presented in Studies sometimes offered scant details on the preparation techniques for the cures, which made it challenging to duplicate them. This was done on purpose in some circumstances to safeguard intellectual property rights. 4Data on side effects were only supplied by a few studies (3 case studies [11]. 13 cohort studies, and 4 controlled trials). It appears that individuals were not asked about side effects or new symptoms since beginning medication in the previous studies. None of the studies cited any significant

negative outcomes. Only three cohort studies, three controlled trials, and two studies that monitored electrocardiograms showed impacts on biochemical variables (most frequently, liver function tests). There were no poisoning cases documented. However, minor side effects can still be significant. For instance, nearly 50% of those receiving the Ugandan herbal Because of their bitter taste, antimalarials are challenging to administer to youngsters. It is common to need to take doses more than once, and the volume may be more than with other types of medication. 5On days 4–7 following therapy [12]. 100% parasite clearance was observed in six of the cohort studies on falciparum malaria, and clearance rates of more than 90% were reported in three more investigations. However, only two of these nine studies—and only five of them had more than 40 patients—have follow-up information beyond this point. Cohort studies have the drawback that the trial group may be semi-immune to malaria, clearing parasites and resolving symptoms without the need for effective treatment [13].

## 7. Antimalarial herbal drug

### 1) Cinchona bark:

**Synonym:** Jesuit's bark, Peruvian bark, quinquina

**Biological source:** it is the dried bark of the stem or root of it.

**Family:** Rubiaceae

**Chemical constituents:** Quinine & Quinidine, cinchonidine, quinic acid keno-tannic acid,quinorin,

**Use:** using appetite promoting the release of digestive juices, and other stomach vessel disorders including hemorrhoids, varicose veins and leg cramps.

### 2) Artemisinin

**Synonyms:** Qinghaosu

**Biological source:** Artemisinin are derived from of sweet worm woof (*Artemisia annua*)

**Family:** Asteraceae

**Chemical constituents:** components was found to be davanone (30.80%), followed by B- pinene(15.30%) and germacrene-D (5.82%,)

**Use:** Alternative to more aggressive cancer treatment.

### 3) Tulsi

**Synonyms:** holy basil

**Biological source:** Tulsi consists of the fresh and dried leaves of ocimum

**Family:** Lamiaceae

**Chemical constituents:** Eugenol (1-hydroxy-2-methoxy-4-allylbenzene),

**Use:** Tulsi leaves boiled with tea might be helpful for malaria and dengue.

#### 4) **Curcumin:**

**Synonyms :**Curcuma longa

**Biological source:** Turmeric is the dried rhizome of Curcuma longa Linn.

**Family:** Zingiberaceae

**Chemical constituents :** The main active components of the rhizome are the nonvolatile curcuminoids and the volatile oil [14].

**Use:** curcumin may represent a novel treatment for malarial infection

### **8. Extraction of Antimalarial herbal drug**

Plant Extraction:

The following step involved macerating 100 g of the powdered materials in 80% methanol while they were continuously shaken at room temperature for 48 hours. The resultant methanol-soluble fractions were placed into a rotary evaporator and concentrated under reduced pressure at 35°C after vacuum filtering using Whatman filter sheets. The extracts were transferred to airtight vials and kept at 4°C and out of the light [15].

Virus Culture:

For the in vitro production of the erythrocytic stages of the CQ-sensitive (3D7) and CQ-resistant strain (K1) of *P. falciparum*, Trager and Jensen's original suggested methodology was utilised [16].

### **9. Conclusion**

The use of medicinal plants has a long history in many nations, and the necessary knowledge is centuries old. A continuing worry is the parasite's recent medication resistance, which makes malaria a threat to everyone's health.

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