

Noteworthy contributions in antimalarial activity of plant constituents

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Abstract

Plant-derived products are now gaining recognition worldwide currently recommended for primary healthcare, but only a few plants have received rigorous scientific investigation. Herbal drugs are the potential source of various plant constituents which are responsible for the prevention and treatment of a range of diseases. The present work mainly summarizes the evaluation of antimalarial activity of medicinal plants by various researchers. This helps in decisive objective of finding narrative anti-malarial compounds, which can be used in the struggle against drug-resistant malaria. Moreover, the use of new technologies and methodologies in accordance with sound scientific ideology is encouraged.

Keywords: plants, malaria, research, investigation

Introduction

Malaria is a major health problem in about tropical and subtropical countries. It is estimated that many people die yearly as a result of malaria. Malaria is becoming more resistant to a number of current drugs and is on the increase because of the global warming process [1]. Thus, many communities who live in endemic areas have started to look for malaria remedies in plants in their local environments. Resistances of mosquitoes to insecticides and parasites to antimalarial drugs especially to the current most effective and newest plant derivatives have led to an increase in severe malaria and make difficult the abolition of the disease as well as the renaissance of malaria [2]. Preventive and treatment strategies of malaria in the face of current resistance problems, medicinal plants are a potential source of new, effective and affordable antimalarial agents [3]. Medicinal plants have a vital role for the prevention and treatment of various diseases from ancient times. The use of medicinal plants as raw materials in the production of new drugs is ever increasing because of their potentials in combating the problem of drug resistance in micro-organisms. Plant sources as anti-malarial agents have gained a lot of interests since the discovery of many herbal drugs [4]. Thus, the present work mainly summarizes the evaluation of antimalarial activity of medicinal plants by various researchers.

2. Noteworthy contributions by various researchers in anti-malarial activity of medicinal plants

2.1 *Anthocleista djalensis*

Antia S Basse and co-workers evaluated *in vivo* antimalarial activities of ethanolic leaf and stem bark extracts of *Anthocleista djalensis*, in mice infected with plasmodium berghei. In this work, ethanolic extract of *Anthocleista djalensis* leaves (1000-3000 mg/kg/day) and stem bark (220-660 mg/kg/day) were screened for blood schizonticidal activity against chloroquine sensitive plasmodium berghei in mice. Obtained results exhibited a significant antiplasmodial activity both in the 4 day early infection test, which was incomparable with standard drug chloroquine [5].

2.2 *Boerhavia elegans* and *Solanum surattense*

Ali Ramazani and co-workers assessed *in vitro* and *in vivo* anti-malarial activity of *Boerhavia elegans* and *Solanum surattense*. Results reported that *Boerhavia elegans* and *Solanum surattense* showed promising anti-plasmodial activity *in vitro* (IC₅₀ ≤ 50 µg/ml) and *in vivo* with no toxicity [6].

2.3 *Gongronema napalense*

Libman Amey and co-workers evaluated *Gongronema napalense* for antimalarial activity and reported that CHCl₃ extract from the vine of *Gongronema napalense* (Wall.) Decne. (Asclepiadaceae) showed promising anti-malarial activity while exhibiting low levels of cytotoxicity [7].

2.4 *Jatropha tanjorensis*

Omorieg ES and co-workers assessed *in vitro* antiplasmodial activity and cytotoxicity of extracts from *Jatropha tanjorensis* leaves. Antiplasmodial activity was evaluated *in vitro* by using a 3D7 chloroquine sensitive clone of NF-54 isolate of *Plasmodium falciparum*. Results stated that ethanolic extract of *Jatropha tanjorensis* leaves exhibited the highest antiplasmodial activity relative to other two extracts against chloroquine sensitive strain of *Plasmodium falciparum* [8].

2.5 *Nigella sativa*

Abdulelah and co-workers were screened ethanol, chloroform and aqueous seed extracts of *N. sativa*, in the 4-day suppressive assays for their anti-malarial properties against *Plasmodium berghei* in mice. Obtained results stated both intraperitoneal and oral treatments of the seeds extracts showed suppression activities in all groups of mice [9].

2.6 *Piper betle*

Abdulelah H and co-workers evaluated the crude methanol extract of *Piper betle* leaves (50-400 mg/kg) for its antimalarial activity against *Plasmodium berghei* (NK65)

during early and established infections. The leaf extract demonstrated significant ($P < 0.05$) schizonticidal activity in all three antimalarial evaluation models ^[10].

2.7 Vernonia ambigua

Builders MI and co-workers evaluated *Vernonia ambigua* for its antimalarial potential. Freeze dried decoctions of the whole plant of *Vernonia ambigua* were used for the study. Decoction showed the presence of alkaloids, flavonoids, saponins and tannins. Results concluded the moderate *in vitro* antiplasmodial activity ^[11].

2.8 Swartzia madagascariensis, Combretum glutinosum and Tinospora bakis

Ouattara Y and co-workers evaluated the *Swartzia madagascariensis*, *Combretum glutinosum* and *Tinospora bakis* for antimalarial activity. Aqueous, methanol, hydromethanol extracts from the roots bark of *S. madagascariensis*, methanol and hydromethanol extracts from the leaves of *C. glutinosum* and aqueous and alkaloidal extracts from the roots of *T. bakis* were also made and their antimalarial activity was screened against *Plasmodium falciparum* chloroquine-resistant strain W2 *in vitro*. Results stated that methanol and hydromethanol extracts of *Swartzia madagascariensis*, hydromethanol extracts of *Combretum glutinosum* and alkaloidal extracts of *Tinospora bakis* were active ^[12].

2.9 Spathodea Campanulatum

Rangasamy Dhanabalan and co-workers evaluated *Spathodea campanulatum* for antimalarial activity against clinically isolated *Plasmodium falciparum* chloroquine-resistant and sensitive strains. Results concluded that ethanol fraction exhibited very good antiplasmodial activity against both chloroquine sensitive and resistant *Plasmodium falciparum* isolates followed by the butanol and chloroform extracts ^[13].

Table 1: Medicinal plants with anti-malarial potential

S.N.	Species	Family	Other use
01	<i>Anthocleista djalensis</i>	Loganiaceae	Febrifuge, Laxative
02	<i>Spathodea campanulatum</i>	Bignoniaceae	Anti-inflammatory
03	<i>Nigella sativa</i>	Ranunculaceae	Anti-viral
04	<i>Gongronema napalense</i>	Asclepiadaceae	Treatment of leucorrhoea
05	<i>Vernonia ambigua</i>	Asteraceae	Febrifuge
06	<i>Piper betle</i>	Piperaceae	Antibacterial
07	<i>Swartzia madagascariensis</i> ,	Leguminaceae	Treat jaundice
08	<i>Combretum glutinosum</i>	Combretaceae	Diuretic
09	<i>Tinospora bakis</i>	Menispermaceae	Liver complaints
10	<i>Boerhavia elegans</i>	Nyctaginaceae	Anti-inflammatory
11	<i>Solanum surattense</i>	Solanaceae	Antipyretic,
12	<i>Jatropha tanjorensis</i>	Euphorbiaceae	Haematinic agent

3. Conclusion

Natural remedies are more acceptable in the belief that they are safer with fewer side effects than the synthetic ones. Herbal formulations have growing demand in the world market. This review work focuses on the potential of medicinal plants for antimalarial activity. It also makes an effort to provide a scientific account of medicinal plants available for the preparation of herbal drugs to overcome the problems associated with parasitic diseases.

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