

THE PLACE OF HERBAL MEDICINE IN THE TREATMENT OF MALARIA IN GHANA

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Malaria remains the greatest single infectious disease threat to the health of the world. Third world countries are the worst affected. Malaria is characterized by fever and it is now well established that it is caused by sporozoa of the genus *Plasmodium*.

Fevers are common in the tropics and the causes are legion. Malaria undoubtedly is one of the common causes of fever.

Man has recognized and utilized plants as medicine to control fevers for generations. In Ghana, several plants have been used and are being used in the treatment of fevers including malaria.

Until recently very little work has gone on to screen medicinal plants used for fever in folklore. The story of quinine from the bark of the South American plant, *Cinchona*, is well known. Another important antimalarial of plant origin widely used in China since the 10th century and in clinical use today is qinghaosu (*Artemisia annua* L.)

The two most widely used plants for the treatment of fever are *Azadirachta indica* and *Khaya senegalensis*.

Azadirachta indica - is a commonly used medicinal plant either alone or in combination with other plants for the treatment of fevers and other conditions. The empirical basis of the therapeutical application of this medicinal plant have long been laid down in classical texts of Ayurveda, Siddha and Unani. Preparations from the bark (including the root-bark) and leaves are used as remedy for fevers (including malaria fever). The plant accumulates an array

of interesting chemical constituents including flavonoids, tri- and diterpinoids and polysaccharides. Ekanem et al¹ have shown the plant has definite schizontocidal effect in mice.

Khaya senegalensis - *A Juss* and the related species *Khaya ivorensis*, *A Chev* (Meliaceae) are well known medicinal plants along the West Coast of Africa. The bitter stem barks of these plants are used as antipyretic, antibacterial and fever remedies. Chemical studies on the stem bark of these plants have led to the isolation of sterols and coumarins. These chemicals may be responsible for some of the observed medicinal effects of these plants in man.

Recently, with the increasing incidence of resistance of the *Plasmodia* species responsible for human malaria, to the available synthetic antimalarials, coupled with the recent awareness of the potential of traditional medicines as a source of drugs, research work has started in earnest to screen medicinal plants especially those used in fevers, for antimalarial activity.

A recent review of the literature showed interesting data on the undermentioned plants:-

- 1) *Alstonia boonei*
- 2) *Azadirachta indica*
- 3) *Morinda lucida*
- 4) *Khaya senegalensis*

All these as indicated above have been used in the treatment of fevers for generations.

In the studies by Makinde and Salako² and Awe

and Makinde³ - Male albino swiss mice (18-22g) were inoculated with 1×10^7 drug sensitive *P. berghei berghei* erythrocytes -

1) **Prophylactic Action:-** The plant extract or pyrimethamine was administered orally for 3 consecutive days to the mice. The mice were then inoculated with *P.berghei berghei*. The resulting parasitaemia was assessed 72 hours after inoculation.

The observed results were as follows:

Plant Extract	Chemosuppression (%)
<i>Alstonia boonei</i>	70.0
<i>Azadirachta indica</i>	21.7
<i>Morinda lucida</i>	70.0
<i>Solanum erianthum</i>	78.9
<i>Khaya senegalensis</i>	68.0
Pyrimethamine (1.2mg/kg/day)	90.0

2) **Schizontocidal Activity** - was assessed by the following tests:

(i) The Foundary Test

(ii) The Rane Test

with chloroquine as standard.

(i) **The Foundary Test** - the plant extract or chloroquine was administered orally to mice once daily for 4 consecutive days starting from the day of infection - day 0 to day 3. Activity was assessed from parasite counts in tail blood samples made on day 4, and counts in untreated mice, compared with those from mice that received chloroquine 5mg/kg/day.

The observed results were as follows:

Plant Extract	Chemosuppression (%)
<i>Alstonia boonei</i>	75.1
<i>Azadirachta indica</i>	41.2
<i>Morinda lucida</i>	49.4
<i>Solanum erianthum</i>	56.2
<i>Khaya senegalensis</i> (aqueous)	56.0

<i>Khaya senegalensis</i> (methanolic)	64.0
Chloroquine (5mg/kg/day)	91/4

(ii) **The Rane Test** - the plant extract or chloroquine was administered orally once daily for 4 days starting from 72 hours after infection. Daily activity was assessed for 5 days starting on the 4th day of infection.

The results indicated that the following plant extracts showed daily increases in parasitaemia; *Alstonia boonei*, *Azadirachta indica*, *Solanum erianthum*, *Khaya senegalensis* and Controls. *Morinda lucida* and Chloroquine (5mg/kg/day) showed significant reduction in parasitaemia.

In summary, the plant extracts studied above showed prophylactic and schizontocidal activities while they showed no demonstrable suppressive effect when the infection is already established except in the case of *Morinda lucida*.

Cryptolepis sanguinolenta (Periplocaceae)

Cryptolepis sanguinolenta Lindl. Schr. family Periplocaceae grows wild as a twining and scrambling shrub along the West Coast of Africa. The root decoction has been used by Ghanaian traditional healers for generations, for the treatment of fevers, urinary infection and upper respiratory tract infection. This plant has been a subject of intensive study by scientists both in Ghana and Nigeria in a collaborative effort.

The root decoction of *C. sanguinolenta* has been used clinically by Ampofo and co-workers at the Centre for Scientific Research into Plant Medicine (CSRM) for the treatment of malarial fever.

Phytochemical investigation led to the isolation of the alkaloids, cryptolepine, quindoline, and a phenolic derivative coded CSA-3⁴. Cryptolepine had been isolated earlier from the root extract of the Belgian Congo plant *C. triangularis*⁵.

Gellert et al⁶ showed that cryptolepine produced marked hypotensive effect which ac-

complicated vasodilatation in anaesthetised dogs, and lowered body temperature. The anti-hypertensive action of cryptolepine has been recently confirmed by Noamesi⁷. Cryptolepine has also been shown by Bamgbose and co-workers⁸ to inhibit carrageenan-induced oedema, and this may be useful as an anti-inflammatory agent similar to aspirin or indomethacin.

Microbiological studies on cryptolepine by Boakye-Yiadom and Dwuma-Badu⁹ and Boakye-Yiadom & Heman-Ackah¹⁰ showed that it is active against both gram-positive and gram-negative organisms, specifically *Neisseria gonorrhoea*, *Escherichia coli* and *Candida albicans*. The anti-bacterial spectrum found corresponded to that for urinary tract and upper respiratory tract infections.

Preliminary work by Peters failed to confirm the antimalarial activity of cryptolepine, observed clinically. Peters¹¹, however, reported that cryptolepine, had positive activity against rickettsia-like organisms, such as *Eperythozoon coccoides* which is common in laboratory mice and suggested that cryptolepine may be useful for infections such as anaplasma in cattle.

Recently, Bray¹² working in Peter's laboratory at the London School of Tropical Medicine has confirmed the antimalarial activity of the crude extract of *C. sanguinolenta* *in vitro*.

Table 2 shows parasite density counts - (expressed arithmetically, logarithmically, and by Bruce-Chwatt's parasite density index) of 12 cases followed up in a *C. sanguinolenta* extract trial on *Plasmodium falciparum* at the clinic of the Centre for Scientific Research Into Plant Medicine at Mampong-Akwapim. The preliminary data in Table 2 shows a parasite density index of 9.0 on day 0 reducing to 2.5 on day 4 and zero thereafter. The parasite clearance time is 3.3 days (compared to 2.7 days for chloroquine).

From the above discussion, there is ample evidence that *C. sanguinolenta* is a potential source of useful drugs for both man and animals, and by preparing synthetic analogs of cryp-

tolepine and carrying out structure activity relationship studies, new antimalarial, new anti-hypertensive and new anti-inflammatory drugs are possible. Concerted and intensive effort, as well as substantial financial resources are needed to achieve this end.

CONCLUSION

Future Prospects of Medicinal Plants with Antimalarial Activity

From this short discussion it would seem that there is a wealth of traditional wisdom about the healing powers of plants which could be used directly or indirectly to synthesize new drugs in Ghana and other African countries for the treatment of malaria and other diseases. This has been ignored.

Secondly, deforestation and desertification are rapidly eradicating medically important plants before scientist recognize their potential in preserving the human species.

It is my fervent hope that this discussion will stimulate interest into research in this potentially lucrative area of work in order to help Ghanaian scientists bring out cheap, safe and effective antimalarials for our peoples in the not too distant future.

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