

Malaria, A Widely Prevalent Mosquito-Borne Infection in Humans and Recommended Herbal Therapy

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Abstract

Malaria is an infectious vector-borne disease spread by mosquito bite to humans and other animals caused by Plasmodium group of protozoan parasites. The disease is widespread in tropical and subtropical regions including Sub-Saharan Africa, Asia, and Latin America. Malaria causes symptoms that typically include fever, headaches, fatigue and vomiting. This partial resistance disappears over months to years if there is no ongoing exposure to malaria.

Keywords

Blood, Malaria, Parasite

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INTRODUCTION

In severe cases it can cause yellow skin, seizures, coma or death. These symptoms usually begin 10-15 days after being bitten. In those who have not been appropriately treated disease may recur months later. In those who have recently survived an infection, re-infection typically causes milder symptoms¹. Five species of Plasmodium can infect and be spread by humans. Most deaths are caused by *Plasmodium falciparum*². The disease is transmitted by the bite of an infected female Anopheles mosquito. This bite introduces the parasites from the mosquito's saliva into a person's blood. The parasites then travel to the liver where they mature and reproduce².

PATHOPHYSIOLOGY OF THE INFECTION

Within the red blood cells, the asexual reproduction of the parasites occurs, periodically breaking out of their host cells

to invade fresh red blood cells. The classical descriptions of waves of fever arise from simultaneous waves of merozoites escaping and infecting red blood cells. Some *P. vivax* sporozoites produce hypnozoites that remain dormant for periods ranging from several months (7–10 months is typical) to several years and do not immediately develop into exoerythrocytic-phase merozoites. After a period of dormancy, they reactivate and produce merozoites. Hypnozoites are responsible for long incubation and late relapses in *P. vivax* infections, although their existence in *P. ovale* is uncertain³.

DETECTION OF THE PARASITES

PCR based detection of the parasite's DNA have been developed. Laboratory diagnosis of the infection includes microscopic examination of blood using blood films, or with antigen-based rapid diagnostic tests.

TREATMENT RECOMMENDED

The recommended treatment for malaria is a combination of antimalarial medications that includes an artemisinin. The second medication may be mefloquine, lumefantrine, or sulfadoxine/pyrimethamine. Quinine along with doxycycline may be used if an artemisinin is not available. The risk of disease can be reduced by preventing mosquito bites by using mosquito nets and insect repellents, or with mosquito-control measures such as spraying insecticides and draining standing water. Despite a need, no effective vaccine exists, although efforts to develop one are ongoing⁴.

RECOMMENDED HERBAL DRUGS FOR MALARIA TREATMENT

Traditional medicines have been used to treat malaria for thousands of years and are the source of the two main groups

(artemisinin and quinine derivatives) of modern antimalarial drugs⁵.

The Research Initiative on Traditional Antimalarial Methods (RITAM) was founded in 1999 with the aim of furthering research on traditional medicines for malaria. The initiative now has in excess of 200 members from over 30 countries. It has conducted systematic literature reviews and prepared guidelines aiming to standardise and improve the quality of ethnobotanical, pharmacological, and clinical studies on herbal antimalarials and on plant based methods of insect repellence and vector control. We review some of this work and outline what can be learnt from the developing countries on the management and control of malaria⁶.

SUMMARY

For most of its human life cycle the malarial parasites reside within the liver and blood cells and are protected from host immune defense. However, some of the parasites in the circulation are destroyed in the spleen⁵. To avoid this fate, the *P. falciparum* parasite displays adhesive proteins on the surface of the infected blood cells, causing the blood cells to stick to the walls of small blood vessels, thereby sequestering the parasite from passage through the general circulation and the spleen. Sequestered red blood cells can breach the blood–brain barrier and cause cerebral malaria. Cerebral malaria is defined as a severe *P. falciparum*-malaria presenting with neurological symptoms, including coma, or with a coma that lasts longer than 30 minutes after a seizure⁷.

With the problems of increasing levels of drug resistance and difficulties in poor areas of being able to afford and access effective antimalarial drugs, traditional medicines

could be an important and sustainable source of treatment.

REFERENCES

1. White NJ. Determinants of relapse periodicity in *Plasmodium vivax* malaria. *Malaria Journal*. 2011; 10: 297. doi:10.1186/1475-2875-10-297
2. Caraballo H, King K. Emergency department management of mosquito-borne illness: Malaria, Dengue, and West Nile virus. *Emergency Medicine Practice*. 2014; 16 (5): 1-23.
3. Richter J, Franken G, Mehlhorn H, Labisch A, Häussinger D. What is the evidence for the existence of *Plasmodium ovale* hypnozoites? *Parasitology Research*. 2010; 107 (6): 1285–90. doi:10.1007/s00436-010-2071-z
4. Organization, World Health. Guidelines for the treatment of malaria (2nd ed. ed.). Geneva: World Health Organization. 2010; pp. ix. ISBN 9789241547925.
5. Willcox, Merlin L., Bodeker, Gerard. Traditional herbal medicines for malaria. *BMJ*. 2004; 329(7475): 1156–9. doi: 10.1136/bmj.329.7475.1156 [PubMed]
6. Bodeker, G., Willcox, M.L. Conference report: the first international meeting of the Research Initiative on Traditional Antimalarial Methods (RITAM). *J Alternative Complementary Med* 2000;6: 195-207. [PubMed]
7. Tilley L, Dixon MW, Kirk K. The *Plasmodium falciparum*-infected red blood cell. *International Journal of Biochemistry and Cell Biology*. 2011; 43 (6): 839–42.