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FILE: ▪Annual Wormwood (*Artemisia annua*)
▪Malaria
▪*Plasmodium falciparum*

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RE: A Study of Annual Wormwood to Treat Malaria

Muellar MS, Runyambo N, Wagner I, Borrmann S, Dietz K, Heide L. Randomized controlled trial of a traditional preparation of *Artemisia annua* L. (annual wormwood) in the treatment of malaria. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 2004;98:318–321.

Annual wormwood (*Artemisia annua*) is native to Asia and has become naturalized in many other parts of the world, including Europe and the United States. Annual wormwood grows approximately up to 3.5 feet tall. Its first recorded medicinal application was in 340 BCE, in the *Chinese Handbook of Prescriptions for Emergency Treatments*. Traditionally it has been used for the treatment of fevers. Artemisinin, a sesquiterpene lactone with an endoperoxide bridge, was defined in 1996 and has since been studied for its antimalarial activity.

This randomized, open-label trial analyzed the antimalarial activity of annual wormwood in 132 volunteers previously diagnosed with malaria. The study occurred from February to December 2001 in a district hospital and three health centers in the Democratic Republic of the Congo. Participants received either annual wormwood tea (5 grams herb/L or 9 grams herb/L, containing 47 and 97 mg artemisinin per liter, respectively) or quinine sulphate (500 mg three times a day for 7 days), a standard pharmaceutical treatment for malaria. Those who were placed in the groups receiving the tea were instructed to drink 1 liter per day for 7 days. Each treatment was evaluated for its ability to cure the subjects of malaria after 7, 14, 28, and 35 days of treatment. Cure was defined by negative standard blood test for malaria. On day 3 of treatment, symptoms such as fever, chills, fatigue, vomiting, and abdominal pain were also measured.

After 7 days of treatment, 77% of the subjects in the low-dose artemisinin group, 70% of the volunteers in the high-dose artemisinin, and 91% of volunteers in the quinine group were cured. There was a high rate of renewed activity of the parasite over time, and the cure rate after 35 days dropped to 34%, 30%, and 79%, respectively. Symptom relief in each treatment group was similar. Compared to symptoms prior to the start of treatment, 91% of subjects in

the low-dose herb group, 81% of subjects in the high-dose herb group, and 92% of subjects in the quinine group experienced resolution of fever. Chills resolved in 92%, 100%, and 100% of volunteers, respectively. Fatigue resolved in 88%, 73% and 70% of participants, respectively; vomiting in 86%, 100%, and 76%, respectively; and abdominal pain in 100%, 83%, and 86%, respectively.

Malaria is a chronic illness caused by infection with the organism *Plasmodium falciparum*, which is carried and transmitted by mosquitos. The World Health Organization (WHO) estimates that there are 300-500 million new cases of malaria each year, mostly in Africa. Attempts to eradicate malaria have been unsuccessful due to the development of pesticide resistance in mosquitos and drug resistance by *P. falciparum*. Therefore, researchers are seeking alternative ways to combat this pandemic.

Although this study did not show as high a cure rate as treatment with quinine, symptomatic relief was comparable between treatment groups. One possible explanation for this is that the dosage of annual wormwood used was too small. The authors write, "the traditional *Artemisia* preparations contained at best 94 mg artemisinin/L" which is 19% of the usual dosage of pure artemisinin (500 mg/d). The high-dose annual wormwood group in this study consumed 97 mg of artemisinin per day, which, according to the authors, had previously shown high malaria recurrence after treatment. Additional trials using higher doses of artemisinin are therefore warranted.

—John Neustadt, ND4

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