INTRODUCTION

Malaria occurs in most equatorial, tropical, and semi-tropical areas of the world. Malaria kills between 100 million and 300 million people worldwide annually, with over half of those deaths in young children. The estimated economic impact is enormous, with over 200 billion dollars a year spent on the global malaria epidemic in Africa alone (Rothschild 2004).

Malaria is caused by a one-celled parasite, a protozoan, Plasmodium spp. Although there are over 170 species of Plasmodium, only four infect humans: Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae, and Plasmodium ovale. The parasite is transmitted through the bite of the female anopheline mosquito. These parasites (sporozoites) then travel to the liver where they mature into intrahepatic sporozoites. These cells have matured, they burst out of the liver and invade red blood cells. In 48 to 72 hours the sporozoites burst out of the red blood cells and cause the high fever and acute reaction in humans. Sporozoites mature into trophozoites, the stage capable of infecting mosquitoes and being transmitted (after a maturation process in the mosquito) to another person.

In Mali, many medical treatments are available because of a lack of other available medicines and prohibitive costs of Western treatments. Participatory assessment by MSU-Bozeman externs in 2005 (Kante et al. in review) in 2 Mali communes (11 villages) indicated malaria was the number one concern.

The purpose of this research project is to assist initiatives of the Mali Agroindustry Network and the National Institute of Health (NII).

MATERIALS AND METHODS

We choose a holistic, participatory approach (Chambers et al. 1989, Savory and Butterfield 1999). Active involvement of Malians, including villagers, is imperative to sustainably help Mali combat malaria. Input and critique by Malians was incorporated at each step in this project.

We selected one village from 11 surveyed by MSU Undergraduate Scholars in 2005, the Bambara farming village of Sanambélé (Commune Diakelereba) to conduct holistic discussions that included malaria issues.

Separate surveys were developed for in-depth interviews with individual villagers in Sanambélé and the city population in Mali. In Mali, data were gathered with these instruments in the knowledge of causes and symptoms of malaria as well as natural remedies preferred. Mende conducted many surveys in a wide range of economic levels and areas in Bamako and in village of Sanambélé. These surveys gave general knowledge of the types of methods used for malaria treatments as well as treatments available.

Mende also conducted in-depth interviews (with Malahey of both genders in diverse ages, socioeconomic groups) to determine specific ways to prepare ethanol and water extracts to test these samples for activity against Toxoplasma gondii a parasite in tissue culture at MSU-Bozeman (Dr. Whitfield is lab).

In the Toxoplasma lab, Mende practiced tissue culture procedures. Mende, Jerome, and Whitfield developed methods to use the culture to test the Malien extracts. Tissues culture are human foreskin fibroblasts in tissue culture sample containers. Toxoplasma see include both normal and variant strains created by Dr. White’s lab.

Robyn Klein provided detailed advice on collection, storage, and preservation techniques including alcohol tinctures and water extract methods.

Plants were obtained with help of Sanambélé village midwife, Awa Diarra, who also explained extraction methods and dosage.

Extracts were made with water using a 1:2 ratio of plant to water, while a 40:80 ratio of alcohol to water was used for the tincture process in a 1:5 ratio with the plants.

Mende visited the University of Medicine and Pharmacology in Bamako to discuss the advent of a malaria vaccine and isolation of resistance factors with scientists associated with the World Health Organization (WHO) and the National Institutes of Health (NIH).

RESULTS

Four medicinal plants are commonly used in the village of Sanambélé called, in the native language of Bambara: joun, kosafine, sinjan, and bari.

Scientific names for the plant samples are:

- Nauchlaia isletica S. Sm. Syn. Sarcocheilus isleticus (Sm.) Bruce (Rubiacéeceae)(Bambari bari)
- Cassia Sibiriana (Fabaceae)(Barima: sinjan)
- Vernonia cotinifolia (Walt.) Drake (Asteracéeae)(Bambari: kosafine)
- Alpinia inermis (Bambari: joun)

A commercial medicinal tea was obtained as a control in the Toxoplasma bioassay. This tea contains three plant species sanctioned by the National Institute of Therapeutic Medicine in Bamako. Mali which clinically tested each species for effectiveness against human malaria Plasmodium spp.

Collection of these 4 plant species were made by Dettwyler for herbarium voucher specimens and verified by Saidou Ouattara, Dr. Drissa Diallo, and Soriba Ibrahim Traoré.

Mende visited the Mali Institute of Medicine’s Vaccine Development Program to obtain understanding of need for local solutions to malaria infections until a vaccine becomes available.

DISCUSSION

This research will point the way to local plants Mali use effectively in malaria treatments instead of Western preparations. Tradition also dictates the use of medicinal plants instead of Western preparations.

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