



ETHNOBOTANICAL UTILIZATION OF SOME MEDICINAL PLANTS BY BODO PEOPLE OF MANAS BIOSPHERE RESERVE IN THE TREATMENT OF MALARIA

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ABSTRACT

Malaria is a parasitic disease caused by *Plasmodium falciparum* and *P. vivax*, transmitted by a female Anopheles mosquito from the blood of an infected person to a healthy person. Malaria is one of the major problem in North-East India and Assam in particular. Bodo, a tribe of Assam, depends mostly on forest resources for the treatment of several diseases. The present paper highlights on description and mode of utilization of 37 species of medicinally important plants used by the bodo people of the Assam in the treatment of Malaria.

Keyword: Ethnobotany, Medicinal plants, Malaria, Local people, Assam.

INTRODUCTION

Malaria is a parasitic disease caused by *Plasmodium* species transmitted by a female Anopheles mosquito from the blood of an infected person to a healthy person. There are four types of *Plasmodium* sp. causing malaria in humans. Among them two major *Plasmodium* sp. are responsible for malarial infection viz. *Plasmodium falciparum* (51%) and *P. vivax* (49%). *Plasmodium falciparum* is responsible for the most severe cases and so most of the studies have evaluated the activity of compounds on this species. According to the World Malaria Report (WHO 2012), there are approximately 219 million malaria cases and approximately 6, 60,000 people die from malaria each year. South-East Asia is the second most affected region in the World; India has the highest malaria burden with an estimated 24 million cases per year. The well-known use of chloroquine (CQ) and antifolates [sulfadoxine-pyrimethamine (S/P)] for the treatment of malaria are no longer effective in most endemic areas. In many parts of the world the parasites have developed resistance to a number of anti-malarial medicines such as chloroquine and their derivatives, the most widely used treatment for malaria. Therefore, there is an urgent need to discover new compounds with an original mode of action. Plants commonly used in traditional medicines are a source of active new compounds. Due to the crucial role that plant-derived compounds play in drug discovery, isolation of new bioactive compounds from medicinal plants based on traditional use or ethnomedical data appears to be a very promising approach^{18,20}. The herbal healers known as “bej”, “boidyo”, “kibiraj” from various ethnic groups keep their ethno medicinal knowledge confidential as they justify that sharing knowledge with others will result in the loss of healing power- a belief that is closely safeguarded. Therefore, the knowledge of producing herbal medicine in a systematic ritual manner is acquired through ages by experience and is very much guarded secretly among certain families and clan. Very often, most of the valuable data on traditional knowledge of medicinal plants has been lost due to ignorance and as a result are not well documented. The traditional community of Assam has built a precious knowledge of herbal medicine based on the uses of the rich bio-resources of this region. However, the urbanization and reach of modern

health system to remote places and villages have led to negligence towards traditional knowledge related to herbal medicine. Therefore, conservation and documentation of indigenous knowledge on medicinal plants¹⁸. Assam, known as the mother of rivers and blue hills is the gateway to the north-eastern part of India. It is situated between 90°-96° East longitude and 24°-28° North latitude. Assam is bordered in the North and East by the Kingdom of Bhutan and Arunachal Pradesh, India. Along the south lie Nagaland, Manipur and Mizoram. Meghalaya lies to her South-West, Bengal and Bangladesh to her West. Assam with her diverse physiographic and varied climatic conditions bears a separate phytogeographic identity and diverse plant wealth within its much varied ecosystems¹. A good number of valuable accounts have been contributed on the studies of medicinal plants during the last two decades from the North-East region of India^{2,3,5-7,9,10,19}. Knowledge on medicinal plants utilization has been practiced from ancient time of human civilization. Many of the traditional healers, Kabiraj, bez collect the medicinal plants for treatment of various diseases. In the process, they collect the roots, rhizomes, bulbs, flowers, bark, fruits and other medicinally important parts of the plants for extracting drugs. However, unused parts of the plants are left in the forest. In this way, sometimes they destroy the important medicinal plants. However, availability of most of these wild edible species are now depleting rapidly owing to various factors such as encroachment for agricultural and human settlement in forest land, destruction of forest resources in the form of heavy tree felling and collection of fire wood and so on. Consequently, new drugs or drug combinations are urgently needed today for the treatment of malaria. These drugs should have novel modes of action or be chemically different from the drugs in current use. Bodo, one of a major tribe of Assam have immense knowledge in folk based medicine dependent mostly on the forest resources for the treatment of several ailments. The present paper highlights on description and mode of utilization of 24 species of medicinally important plants used by the bodo people of the Assam in the treatment of Malaria.

METHODOLOGY

Frequent field surveys were undertaken during January 2010-December 2012 for collection and documentation of plant species used by the Bodo people in the treatment of malaria. During the investigation, local healers such as bej, kabiraj, oja or traditional healers who have immense knowledge on medicinal plants were consulted to collect information on medicinal plants used in malarial diseases. A method of standard Herbarium technique was followed to prepare herbarium specimens¹⁴. The specimens were identified by consulting different works on Flora of British India¹³, Flora of India¹¹, Flora of Assam¹⁶, Flora of Tripura⁸, Flora of Meghalaya¹², Name changes in Flowering plants of India and adjacent regions⁴, Dictionary of Indian Folk medicine and Ethno botany¹⁵ and confirmed by matching the specimens with the voucher specimen at the herbarium of G. U. Assam and herbarium of BSI, Calcutta, India.

RESULTS

During the survey total 24 species were collected bearing information on mode of utilization in the treatment of malaria. All the species were belonged to Angiosperms; only 2 were monocots and rest were dicot. Plant species have been described in alphabetical order including their botanical names, families, local names in Bodo and Assamese (if any) and mode of utilization.

***Achyranthes aspera* Linn.;** (Amaranthaceae);

Local name: Sampher-ultha (Bodo), Ubhata shat (Ass)

Mode of utilization: A whole part of the plants with small amount of Bear's hair was recommended to take as wearing service (tabeez).

***Adhatoda vasica* Nees.;** (Acanthaceae);

Local Name: Boga Bahak Tita (Ass).

Mode of utilization: 7 leaves of each species of *Adhatoda vasica* Nees, *Aegle marmelos* Correa and *Abutilon indicum* Sweet, and 5inch roots of *Asperagus racemosus* Wild. Were boiled in 1litre of water and concentrated up to a volume of 500ml. 2-spoon of the preparation was prescribed to take thrice daily after meal.

***Ageratum conyzoides* Linn.;** (Asteraceae);

Local Name: Gendhali-bon (Ass.); Bormadari (Bodo).

Mode of utilization: 50g of powdered stem bark of *Alstonia scholaris* (Linn.) R.Br. was mixed with leaf juice of *Ageratum conyzoides* Linn. and *Momordica charantia* Linn. (20ml each). 200ml of warmed water is added to the whole mixture and then filtered. 2 teaspoonful of filtrate is given twice a day for 10days to cure malaria.

***Andrographis paniculata* (Burm. f.) Wall. ex Nees;** (Acanthaceae);

Local Name: Kalmegh, Mahatita (Ass); Sorai-gukha (Bodo)

Mode of utilization: 10g of powdered dry leaves and 25g of dry seeds of *Andrographis paniculata* (Burm. f.) Wall. ex Nees. were soaked in 250ml of water for overnight and then filtered. 2 teaspoonful of filtrate was recommended to take thrice a day for 7days in the treatment of Malaria.

***Azadirachta indica* A. Juss.;** (Meliaceae);

Local Name: Mahaneem, Neem (Ass); Nim (Bodo)

Mode of utilization: Leaves, fruits, seeds and stem bark of *Azadirachta indica* A. Juss. Were pounded together and small globules (approx. 5g each) were prepared and dried in sun. 1

globule recommended thrice a day for 1month to cure malaria.

***Centella asiatica* (Linn.) Urban;** (Apiaceae);

Local Name: Bor manimuni (Ass.); Manimuni geder (Bodo).

Mode of utilization: 7 leaves of *Centella asiatica* (Linn.) Urban, was pounded with black salt and 1 spoonful of the preparation was prescribed daily 2- times after meal.

***Cocos nucifera* Linn.** (Aracaceae);

Local Name: Narikal (Ass), Narikhal biphang (Bodo)

Mode of utilization: 2g of bark of *Cocos nucifera* Linn. and 1g bark of *Ziziphus mauritiana* Lamk., 1 fruits of *Terminalia chebula* Retz. and 1 fruit of *Embilica officinalis* Garten. were cruched together, mixed with water and prescribed to take orally 3-times daily after meal.

***Cyperus rotundus* Linn.;** (Cyperaceae);

Local Name: Mutha-Gha (Ass.); Mutha (Bodo).

Mode of utilization: Mixture of 200g of rhizome of *Costus speciosus*, 200g bark of *Cyperus rotundus* Linn. and 200g bark of *Azardichta indica* A. Juss. were boiled in 1litre water and reduced the volume to one fourth. 2-4 spoons of decoction were prescribed after meal for 15days. During those days diet should be pure vegetarian.

***Clerodendrum viscosum* Vent.** (Verbenaceae);

Local Name: Dhopat-tita (Ass.); Sobkha bendong (Bodo).

Mode of utilization: 250g of leaves of *Clerodendrum viscosum* Vent. were boiled in 250ml water and advised to take 2 spoonful thrice daily after meal.

***Curcuma aromatica* Salisb.** (Zingiberaceae);

Local Name: Keturi, Bonhalodhi (Ass.); Burabood (Bodo).

Mode of utilization: Juice extracted from equal amount of rhizomes of *Curcuma aromatica* Salisb. and *Zingiber officinale* Rosc. were mixed together and prescribed to take 3 spoons of juice thrice a day after meal.

***Holarrhena pubescens* (Buch-Ham.) Wall. ex Don.** (Apocynaceae);

Local Name: Dudh-khoroi (Ass.); Doukhri (Bodo).

Mode of utilization: Equal amount of dry seeds of *Holarrhena pubescens* (Buch-Ham.) Wall. ex Don. and tubers of *Cyperus rotundus* Linn. (approx. 25g each) were grounded to make powder. Stem juice of *Tinospora cordifolia* (Willd.) Hook. was mixed with the powder. 250ml of warm water was added to the mixture, whole mixture was then filtered. 20ml of filtrate was recommended to take orally thrice a day for 10days.

***Leucas indica* (L.) R. Br. ex Vatke;** (Lamiaceae);

Local Name: Doron (Ass); Khansisa (Bodo)

Mode of utilization: Equal amount of leaves of *Leucas indica* (Linn.) R. Br. ex Vatke, *Adhatoda zeylanica* Medik., *Vitex negundo* Linn. are pounded together. Juice was extracted and mixed with 200ml of water and 25g of dry rhizome powder of *Zingiber officinale* Rosc. 2 teaspoonful of the mixture was recommended to take orally twice a day for 10days.

***Mangifera indica* Blume;** (Anacardiaceae);

Local Name: Aam (Ass.), Thaijo biphang (Bodo).

Mode of utilization: 500g of barks was boiled in 5litre of water and volume was reduced up to 500ml and prescribed to take externally for bath and hand washing.

Momordica charantia Linn.; (Cucurbitaceae);
Local Name: Tita kerela (Ass.); Odasi (Bodo)
Mode of utilization: 50g leaf of *Murraya koenigii* (Linn.) Spring. and 50g leaf of *Momordica charantia* Linn. were pounded together. Then extracted juice was recommended orally twice daily for 1 week in treatment of malaria.

Murraya koenigii (L.) Spring.; (Rutaceae);
Local Name: Narahingha (Ass.); Noursing (Bodo).
Mode of utilization: 25g flowers of *Murraya koenigii* (Linn.) Spring. were boiled in 200ml of water for half an hour. 20ml of filtrate was recommended to take orally twice a day for 2 weeks in the treatments of malaria.

Ocimum sanctum Linn.; (Lamiaceae);
Local Name: Bon-Tuloshi (Ass.); Gothe tulsi (Bodo)
Mode of utilization: 3 tea-spoonful juice of equal amount of leaves of *Ocimum sanctum* Linn. and *Piper nigrum* Linn. was recommended orally 3 times daily after meal to cure malaria.

Oroxylum indicum (L.) Vent.; (Bignoniaceae);
Local Name: Bhat-ghila (Ass.); Kharong (Bodo)
Mode of utilization: 50g dried seeds of *Oroxylum indicum* (Linn.) Vent. were pounded and mixed with 200ml of water. This mixture was recommended orally twice daily for 10 days in treatment of malaria.

Piper longum Linn.; (Piperaceae);
Local Name: Pipoli (Ass.); Katimal (Bodo).
Mode of utilization: Mixture of 7 pieces of fruits and bark of *P. nigrum* Linn. and 1 piece of root was boiled in 1 litre of water and reduced the volume of water up to 500ml. 2-3 spoon of mixer was prescribed orally before meal to cure malaria.

Rauvolfia serpentina (Linn.) Benth. ex Kurz. (Apocyanaceae);
Local Name: Sarpagandha (Ass.); Chando gukha (Bodo).
Mode of utilization: 100g fresh roots of *Rauvolfia serpentina* (Linn.) Benth. ex Kurz. and 50g dry leaves of *Andrographis paniculata* (Burm. f.) Wall. ex Nees. were pounded together. Extracted juice was mixed with 250ml of water. 2 teaspoonful of mixture was advised to take orally thrice a day for 15 days.

Scoparia dulcis Linn.; (Scrophulariaceae);
Local Name: Bon-dhonia (Ass.); Bongphang rakheb fisa (Bodo).
Mode of utilization: 7 pieces crushed leaves with 50ml water prescribed to take 3 times daily after food and also used as massage on chest.

Spilenthesis paniculata DC.; (Asteraceae);
Local Name: Piraza (Ass.); Usumai (Bodo).
Mode of utilization: 250ml of juice extracted from fresh leaves of *Spilenthesis paniculata* DC. was boiled with equal amount of water for few minutes and then allowed to cool. 2 teaspoonful of the juice was given twice daily for a week in treatment of malaria.

Syzygium cumini (Linn.) Skeels. (Myrtaceae);
Local Name: Katahi-jam (Ass.); Jambu (Bodo).
Mode of utilization: 10g of barks of both *Syzygium cumini* (Linn.) Skeels. and *Alstonia scholaris* (Linn.) R. Br. were boiled in 1 litre water and reduced to 500ml in volume and 2 spoon of mixer was prescribed orally 2 times daily after

meal.
Vitex negundo Linn.; (Verbenaceae);
Local Name: Posotia (Ass.); Nishinda (Bodo).
Mode of utilization: Equal amount (50g each) of leaves of *Vitex negundo* Linn., *Adhatoda zeylanica* Medik. L. and *Leucas indica* Linn. were pounded together. The extracted juice was mixed with 200ml of water and 25ml of dry rhizome powder of *Zingiber officinale* Rosc. 2 teaspoonful of the mixture was advised to take orally twice a day for 10 days till cure.

Ziziphus mauritiana Lamk.; (Rhamnaceae);
Local Name: Bogori (Ass.); Bogori biphang (Bodo).
Mode of utilization: Mixer of 1g barks and 1 piece fruit of *Ziziphus mauritiana* Lamk., 1 fruit and 10g barks of *Embilica officinalis* Garten., 2 inch of stem of *Z. officinale* Linn. and 2-3 fruits and 3 inch of rhizome of *Piper nigrum* Linn., were crushed with water and recommended orally 3 times daily after meal to cure malaria.

DISCUSSION

During the survey, a total of 37 species and 35 genera belonging to 26 families were recorded used by Bodo people against malaria. Among them only 2 species were monocotyledons and rest were dicotyledons. Various parts of the plants were used in malarial disease, viz. roots, rhizomes, leaves, stem, bark, flower, fruits, and dried seeds. Most of the herbal medicines were prescribed to take orally either in the form of juice or paste except two cases where those were advised to wear the material as garland and tabeez. Various parts of the plants such as roots (4 species), rhizomes (5 species), leaves (13 species), stem (3 species), bark (8 diseases), fruits (5 species), and seeds (4 species) were used against malaria by Bodo peoples of Assam, India. They used leaves in most of the herbal recipe followed by bark, rhizome, fruits, seeds, stems. Total 24 recipes were described, where plant species were used either alone or with the combination of other species. It was also observed that *Embilica officinalis* Garten. and *Piper nigrum* Linn. were used in 3 recipes. But there is no available data regarding the clinical use of these traditional drugs. Neither available knowledge nor double-blind clinical trials and toxicity test have been carried out to assess their anti-malarial efficacy. The native healers opined that those herbal drugs prescribed by them were free from side effects. There is a possibility that anti-malarial compounds with a wide variety of structures can be isolated from these plants which can play an important role in the development of new anti-malarial drugs. Ethno-pharmacological approach appears to be a promising way to find plant metabolites that could be used as templates for designing new derivatives with improved properties²⁰. From the above discussion it can be suggested that there is a scope for collection and documentation of these species for their medicinal utilization against malaria. Therefore, the authors feel that it is an urgent need to conserve and protect these medicinally important plant resources.

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