



The Prevention and Treatment of Malaria in Traditional Medicine of Tetun Ethnic People in West Timor Indonesia

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Received: 📅 July 23, 2019

Published: 📅 July 31, 2019

Abstract

Native people in West Timor Indonesia have been exposed to malaria since long time ago. Because of this experience, it is believed that this community has developed their local concept about malaria, and how to manage it. This research was intended to document and analyze local knowledge and practices of malaria prevention and treatment developed by Tetun ethnic people in West Timor. The research was a field study, conducted through some interviews, discussions and observations. The results of this study showed that this community has long been developing various methods to prevent and threat malaria. The prevention and treatment of malaria in traditional medicine of Tetun ethnic people consists of both herbal and non-herbal methods and supported by some prohibitions and restrictions. The results also showed that the practice of traditional medicine for prevention and treatment of malaria by Tetun ethnic people can be explained scientifically. Medicinal plants that widely used like *Strychnos ligustrina*, *Carica papaya*, *Momordica* sp., *Cleome rutidosperma*, *Physalis angulata*, *Alstonia spectabilis*, *Alstonia scholaris* and *Melia azedarach* have been proven to have antimalarial activities as anti-plasmodial, antipyretic, analgesic, anti-inflammatory and immunostimulant.

Keywords: Local Knowledge; Traditional Medicine; Malaria Prevention and Treatment; Tetun Ethnic; West Timor

Introduction

Traditional communities in ancient times developed their local knowledge about the prevention and treatment of a disease based on their experience interacting with the disease for a long time. This local knowledge was then become a guidance for them to establish strategies to prevent and treat the disease, which were practiced widely in the community, and become their traditional medicine [1,2]. Traditional medicine is a term imposed on pre-scientific medical systems, and defines as a sum total of knowledge, skills and practices based on theories, beliefs and experiences of different cultural customs used in health care, disease prevention and increased physical and mental performance, which have been used for generations from one generation to the next [3,4]. Malaria is an ancient disease that has not been fully eradicated until this time [5]. Since long time ago, malaria was the main infectious disease that often attacks Timorese people, especially in Belu and Malaka Districts in West Timor (Indonesia). Several old manuscripts noted that Timorese people in early of 19th century were suffered from

malaria which caused many deaths [6,7]. Until this time, Belu and Malaka Districts are still hyper-endemic areas of malaria. According to the Global Fund report, in 2014, Belu and Malaka Districts were classified as high malaria endemic areas, with the Annual Parasite Incidence (API) of 12.870/00 and 11.580/00 respectively, higher than Indonesian average API 1.380/00. Various programs for malaria prevention and eradication sponsored by the Indonesian Ministry of Health and World Health Organization such as insecticide-impregnated net, fogging, mass blood survey for early diagnosis and prompt treatment, and treat malaria patient using Artemisinin Combination Therapy (ACT) have been implemented, but decreasing of the API value is still not too convincing [8]. Cultural factors that influence public attitudes and acceptance on the programs of prevention and treatment of malaria are estimated to be one of the obstacles to the success of these programs. The implementation of various disease control programs and strategies often faces major challenges stemming from the social and cultural

situation of the community. The social and cultural situation of a community in a particular place can negatively influence the choice, acceptance and use of interventions in disease control. Many programs of disease control and eradication are unsuccessful because of these social and cultural barriers. Therefore, it is very necessary to understand the local knowledge of the community, including an understanding of the health-illness concept that they believe in. An understanding of this can help policy makers in designing a sustainable and more effective disease control programs [9]. The Tetun ethnic is one of native communities that inhabit territories from the central part of Timor island (in Belu and Malaka districts, Indonesia) to the east (in Republic Democratic de Timor Lester, RDTL). Tetun people are still using traditional medicines to date, and often running various traditional medication rituals [10]. Because of their long-time interaction with malaria, it should be assumed that they have developed their own local knowledge about malaria and methods to prevent and treat it. Therefore, this research was intended to study the local knowledge of the Tetun ethnic people regarding malaria and the methods they have developed for the prevention and treatment of this disease.

Methods

Study Design

This study is a kind of research in the field of medical anthropology. This study was conducted as a qualitative exploratory research, with a field study as main technique, supported by a literature study.

Profile of Study Site and People

This research was conducted in Belu and Malaka Districts located in the central part of Timor island. These areas are located at 9°15' S-9°34' S and 124°40' E-124°54' E. Belu and Malaka are two of Indonesian territories that border directly with the Republic Democratic Timor Leste (RDTL). The topography of Belu Districts is mainly hilly, while Malaka is generally a stretch of flat land. Some areas of Malaka at the south part meet the rainy season twice in a year, while the areas of north part and also Belu areas are only have one rainy season. The main rainy season takes place between November-March due to wind that brings rain from the Indonesian Ocean. This rain occurs evenly in Malaka and Belu regions. The additional rainy season in April-June, which is limited in some areas of Malaka, is affected by wind from Australia that carries moisture from the Timor Sea. Based on the ethnolinguistics, there are four indigenous ethnic groups that live in Belu and Malaka Districts, namely Tetun, Dawan, Kemak, and Bunaq (Marae). Tetun ethnic is the majority ethnic group in Belu and Malaka, consists of approximately 80% of the population. They scattered in almost all sub-districts of Belu and Malaka [11].

The Informants

The informants of this study were people of Tetun ethnic who have lived for long time in Belu or Malaka Districts. They were people with good knowledge and experiences of traditional medicine

practices. The informants were selected through the purposive and snowball techniques. A total of 94 informants (42 men and 52 women) with the age of 40-90 years old were involved in this study. They came from 15 vilages of five sub-districts in Malaka (Wewiku, Malaka Barat, Weliman, Malaka Tengah and Kobalima Timur Sub-districts), and 14 vilages of ten sub-districts in Belu (Raimanuk, Tasifeto Barat, Nanaet Duabesi, Tasifeto Timur, Lasiolat, Raihat, Lamaknen, Kakuluk Mesak, Atambua Barat and Atambua Selatan Sub-districts). These informants consist of traditional public healers, home healers, and traditional medicine users.

Data Collection

Data were collected through several interviews, discussions, and observation. Interviews were conducted with a semi-structured questionnaire. Interviews were intended to collect informations about local knowledge on health-illness concept, symptoms, signs and causes of malaria, traditional methods for the prevention and treatment of malaria, and medicinal plants used for the prevention and treatment of malaria. More deep questions were developed spontaneously based on the answers given by the informants to the previous questions. Interviews and discussions were conducted in Tetun (local language) and Indonesian. We recorded the contents of every interview by wrote a detailed essence of the conversation, but not fully word by word. Several interviews were recorded with audio and video recorder. In this field study, we were assisted by several local guides to search for informants, accompanied in the interviews, to interpreted specific local terms that strange for us, and help us to search, document and collect plant specimens. All plants mentioned by informants were collected in-situ and documented by making photographs and herbaria for taxonomic identification. This field study was conducted from April 2017 to December 2017.

Data Analysis

Data obtained from interviews, discussions and observations were analyzed qualitatively, and presented in narrative or qualitative descriptions [12]. The steps of qualitative analysis are as follows:

- a) Transcription of data: first of all, the interview data, discussions and field observation records were well-transcribed in a neat text.
- b) Data reduction: transcripts were analyzed to marked meaningful parts, and then grouped based on the same characteristics into certain categories, i.e. the local knowledge about health-illness, local concepts about malaria, methods for the prevention and treatment of malaria, and plants used for the prevention and treatment of malaria.
- c) Presentation of data: data that has been grouped were arranged regularly according to each category to make them easy to understand. Data of plants used in malaria prevention and treatment were presented in a table.

- d) Verification and conclusion: determined the meaning of the data presented.

Results and Discussion

Local Concepts about Health-Illness

The concept of health and illness in Tetun community is very simple. Tetun people define health as a condition of normal, good and not sick. Illness is interpreted as a condition in which someone feels unwell or sick or has a disease in the body. Tetun traditional people state a condition as health or ill by seeing physical signs. A person is said to be health if he/she looks physically strong, fresh, agile, has a bright face and good appetite; and vice versa, if the physical performance seems weak, lethargic, pale face, lack of appetite, then the person is said to be sick or has an illness in the body. Someone is said to have recovered from illness when showing physical signs such as being able to get up, not feel dizzy anymore, being able to walk quickly and to work again, and his/her appetite is back and improved. The concept of Tetun people about health and illness is also associated with the ability to carry out daily life activities. Someone who is still able to work or move without feeling bad or pain in his body, then that person is not said to be sick. People who are clinically suffering from a certain disease but not feel sick and still able to carry out daily activities without being disturbed by the disease, then that person is not considered sick. WHO and Indonesian Ministry of Health define health as a state of complete physical, mental and social well-being, and not merely the absence of diseases or infirmity [13]. Comparing the concept of health according to Tetun people's understanding with this official definition, it can be concluded that the concept of health of Tetun ethnic people is inadequate to describes whole condition called health, because for this community, health and illness are more related to physical performance than psychological and social performance.

Local Concept about Symptoms and Signs, and Causes of Malaria

The indigenous people of Tetun know malaria as is in mana's (hot body, fever) with primary signs and symptoms are high fever, shivering, intermittent fever, headache, muscle and joint pain, pale, yellow eyes, and abdominal pain and/or diarrhea. Many informants did not know that swollen spleen (splenomegaly) is also one of the signs of malaria that is already severe, but they assumed that the swollen spleen can cause fever (they say "malaria"). In general, almost all the informants assumed that malaria is a common, mild and not serious disease, only a sick of hot body or fever. This local concept seems to greatly influences people's perceptions of the danger of malaria and result in reduction of their alertness on malaria and the seriousness of managing this disease. In the local knowledge of Tetun ethnic people, the causes of malaria are: sweet food and drink, chilled, sunburn, fatigue, presence of other disease in the body, magic, cold food and drink, lack of sleep, inadequate post-natal care, spicy food, alcohol, and oily or fatty food. Tetun

ethnic people assumed that sweet food and drink, sunburn, magic, spicy food, alcohol, and oily or fatty food cause an excessive heat in the body, and as a result, someone will get high fever malaria. Chilled, cold food and drink, lack of sleep is assumed to cause cold entering the body, and as the result, someone will get shivering malaria. The fatigue, presence of other disease in the body and inadequate post-natal care for mother and infant are assumed to destroy the equilibrium of hot and cold in the body and result in malaria with high fever and/or shivering. According to some informants, mosquito as malaria transmitter was a new knowledge that coming from outside, introduced by the Catholic missionaries from Europe. According to Foster dichotomous on causes of disease [14], the causes of malaria in the local concept of Tetun people are naturalistic, not personalistic. Factors such as sweet foods or drinks, long time in rain, water or cold places, long working under the hot sun, fatigue and the presence of other diseases in the body are naturalistic properties that cause heat-cold balance in the human body to be disrupted, and then causes someone to get malaria. Many Tetun people do not consider mosquito as carrier of malaria, causing them to have low awareness of the threat of mosquitoes. This may be one of the causes of the still high endemic of malaria in Belu and Malaka until this time [15].

Methods for The Prevention and Treatment of Malaria

The Tetun ethnic people have their own patterns or habits of life that they do for generations to prevent malaria attacks. The methods that are considered effective in preventing attacks of malaria are: *luli* or *hale'u*, drink medicinal concoction of bitter herbs, eat bitter food, and drink *tua moruk*. *Luli* or *hale'u* means avoiding things that can cause malaria (according to their local concepts about the cause of malaria), which are: not eating sweets frequently, not working for long time under the rain or hot sun, and not too tired at work or physical activities. Eating bitter foods, especially papaya and bitter melon, and drinking bitter palm sap *tua moruk* are also considered effective to prevent someone from being attacked by malaria. Some informants who previously linked malaria with mosquitoes stated that repelling mosquitoes using smoke of burned aromatic plants and sleeping under mosquito nets are effective for malaria prevention. The treatment of malaria in traditional medicine of Tetun ethnic consists of herbal and non-herbal methods. Herbal method consists of drinking herbal concoction, inhaling the vapor of boiled medicinal plant, massage with paste of medicinal plant, bath with water of boiled medicinal plant, and attach the paste of medicinal plant as a cataplasm on the swollen spleen. A non-herbal method is *sunu kok*, that is burning the waist above the swollen spleen using a piece of coconut shell coal or a heated metal. The results of the interviews showed that most traditional medication for malarial patient usually combine two or more methods. It was found also that the role of traditional healer in the treatment of malaria patient is not so important. Tetun ethnic people assumed that malaria is a common and not a serious disease, thus the treatment of malaria does not require a

high competency healer. Several informants stated that they usually conducted self- and home-medication for malaria complaint. In the traditional medicine of Tetun ethnic people, the treatment of malaria is a simple treatment for reducing heat or fever [15]. The assumption of malaria as a common, mild and not a serious disease results in lack of awareness about dangers of malaria. It was found that in many cases, health workers often complain of disobedience of patients who stop taking antimalarial drugs immediately after they feel cured (being able to get up, not feel dizzy anymore, being able to work again, and the appetite is improved), even though *Plasmodium* in their blood has not been completely eliminated. As the result, the success of the malaria eradication program in this area has increased very slowly [8].

Plants Used for The Prevention of Malaria

Tetun ethnic people believe that consumption of bitter food or drink can prevent someone from malaria attacks. Therefore, small children are often forced by their parents to eat stew and drink decoctions of flowers, leaves and young fruit of *Carica papaya*, or young fruit of *Momordica* sp. (*M. charantia* or *M. balsamina*). Some informants gave information that if they feel tired, achy and lack of appetite, they will drink decoction of *Carica papaya* leaves, fruit of *Momordica charantia*, *Melia azadarach* leaves, *Alstonia scholaris*, *Alstonia spectabilis* or *Strychnos ligustrina* stem bark. Consumption of these plants' decoction is believed to restoring body freshness, increasing appetite, eliminating fatigue, and thus, preventing from malaria attack. Some informants also believed that drinking *tua moruk* is effective in malaria prevention. *Tua moruk* is a traditional drink made by fresh tapped palm sap soaked with the stem bark of

Alstonia scholaris, *Alstonia spectabilis* or *Strychnos ligustrina* soaked in it. Several publications of other previous studies showed that the bitter plants used by Tetun people to prevent malaria has been shown to have pharmacological activities as antiplasmodium and immunostimulant [16-18].

Plants Used for The Treatment of Malaria

In this study, we recorded a total of 96 species from 39 families used by Tetun people in various formula for drink, massage, bath, inhalation and cataplast (Table 1). *Strychnos ligustrina*, *Carica papaya*, *Cleome ruidosperma*, *Physalis angulata*, *Alstonia spectabilis*, *Alstonia scholaris* and *Melia azadarach* are some of the most widely plants used in various formula for drink. For massage, *Garuga floribunda*, *Jatropha curcas*, *Acorus calamus*, *Allium cepa*, *Drynaria quercifolia*, *Ocimum* sp. and *Ruta graveolens* are common. For bathing, people use *Tamarindus indica*, *Psidium guajava*, *Melicope latifolia* and *Blumea balsamifera*. Leaves of *Brucea javanica*, *Annona muricata* and *Annona reticulata* are used in inhalation method. Root of *Moringa oleifera* and leaves of *Ficus hispida* are used as cataplast to reduce the swollen spleen [19]. Several plants were found in various formula for more than one mode of application. Several previous publications showed that most of these plants are also used in other traditional medicine for the same purpose in many areas of Indonesia and the world [16,18], and have been scientifically proven to have pharmacological activities as true antimalarial (antiplasmodial) and/or indirect antimalarial such as antipyretic, analgesic, anti-inflammatory and immunostimulant [20].

Table 1: Plants used by Tetun ethnic people for the treatment of malaria.

Scientific Name and Family	Local Name	Source	Part(s) Used	Mode of Preparation	Mode of Administration
<i>Acacia farnesiana</i> (L.) Willd. (Fabaceae)	Bakuro	Wild	Leaf	Boil	Bath
<i>Acacia leucophloea</i> (Roxb.) Willd. (Fabaceae)	Besak	Wild	Bark	Infusion	Drink
<i>Acorus calamus</i> L. (Acoraceae)	Knuan	Cultivated	Rhizome	Paste	Massage
				Boil	Bath
<i>Aegle marmelos</i> (L.) Correa (Rutaceae)	Dilafatuk	Wild	Bark, root	Decoction	Drink
				Paste	Massage
			Leaf	Boil	Bath
<i>Aeschynomene americana</i> L. (Fabaceae)	Ai moe lalek	Wild	Root, leaf	Paste	Massage
<i>Aleuritas moluccana</i> (L.) Willd. (Euphorbiaceae)	Badut mi	Cultivated	Kernel	Paste	Massage
<i>Allium cepa</i> L. (Amaryllidaceae)	Lisa mean	Cultivated	Clove	Paste in coconut oil	Massage
<i>Allium sativum</i> L. (Amaryllidaceae)	Lisa mutin	Cultivated	Clove	Paste in coconut oil	Massage
<i>Alstonia scholaris</i> (L.) R.Br. (Apocynaceae)	Kroti mutin	Wild	Bark	Decoction	Drink
				Boil	Bath
<i>Alstonia spectabilis</i> R.Br. (Apocynaceae)	Kroti metan	Wild	Bark, leaf	Decoction	Drink
			Bark	Boil	Bath
<i>Andrographis paniculata</i> (Burm.f.) Wall. (Acanthaceae)	Karlulu	Wild	Whole plant	Decoction	Drink
				Boil	Bath
<i>Annona muricata</i> L. (Annonaceae)	Ata bot	Cultivated	Leaf	Boil	Inhalation

<i>Annona squamosa</i> L. (Annonaceae)	Ata lotu	Cultivated	Leaf	Boil	Bath
<i>Annona reticulata</i> L. (Annonaceae)	Ata malae	Wild	Leaf	Boil	Bath
					Inhalation
<i>Artocarpus incisa</i> (Thunb.) L.f. (Moraceae)	Kulu	Wild	Leaf	Boil	Bath
<i>Atalantia trimera</i> (Oliv.) Burkill. (Rutaceae)	Asulerok	Wild	Leaf	Paste	Massage
<i>Averrhoa bilimbi</i> L. (Oxalidaceae)	Blidin lotu	Cultivated	Leaf	Boil	Bath
<i>Averrhoa carambola</i> L. (Oxalidaceae)	Blidin wai	Wild	Leaf	Boil	Bath
<i>Blumea balsamifera</i> (L.) DC. (Compositae)	Fafok	Wild	Bark	Decoction	Drink
				Paste	Massage
				Boil	Bath
<i>Bridelia ovata</i> Decne. (Euphorbiaceae)	Knabu	Wild	Leaf	Decoction	Drink
<i>Brucea javanica</i> (L.) Merr. (Simaroubaceae)	Ai lakar	Wild	Leaf, bark, root	Decoction	Drink
				Boil	Bath
				Inhalation	
<i>Calotropis gigantea</i> (L.) R. Br. (Asclepiaceae)	Fuka	Wild	Root	Decoction	Drink
			Leaf	Paste	Massage
				Boil	Bath
			Whole leaf or paste	Cataplasm	
<i>Capsicum annum</i> L. (Solanaceae)	Masimanas, kunus	Cultivated	Fruit	Decoction	Drink
<i>Carica papaya</i> L. (Caricaceae)	Dila	Cultivated	Leaf	Decoction	Drink
			Root	Boil	Bath
<i>Cassia fistula</i> L. (Fabaceae)	Liman tohar	Wild	Bark	Paste	Massage
				Decoction	Drink
				Boil	Bath
			Leaf	Whole leaf or paste	Cataplasm
<i>Cassia siamea</i> Lam. (Fabaceae)	Krui	Wild	Bark	Decoction	Drink
			Leaf	Boil	Bath
				Boil	Bath
<i>Ceiba pentandra</i> (L.) Gaertn. (Malvaceae)	Kabidawa	Cultivated	Leaf	Decoction	Drink
				Paste	Massage
<i>Citrus aurantifolia</i> (Christm.) Swingle. (Rutaceae)	Derok masin	Cultivated	Leaf	Paste	Massage
				Boil	Bath
<i>Cleome gynandra</i> L. (Capparaceae)	Lakaur	Wild	Whole plant	Decoction	Drink
			Leaf	Paste	Massage
<i>Coccinia grandis</i> (L.) Voigt. (Cucurbitaceae)	Kabasa	Wild	Leaf	Decoction	Drink
				Boil	Bath
<i>Cordyline fruticosa</i> (L.) A. Chev. (Asparagaceae)	Riman isin	Wild	Leaf	Paste	Massage
<i>Crinum asiaticum</i> L. (Amaryllidaceae)	Taborut	Wild	Leaf	Maceration	Bath
			Tuber	Paste	Massage
<i>Curcuma domestica</i> Val. (Zingiberaceae)	Kinur	Cultivated	Rhizome	Decoction	Drink
				Paste	Massage
<i>Dendrothoe pentandra</i> (L.) Miq. (Loranthaceae)	Tau tiu ten	Wild	Leaf, bark	Decoction	Drink
				Paste	Massage
<i>Drynaria quercifolia</i> (L.) J. Smith. (Polypodiaceae)	Manliras	Wild	Tuber	Paste	Massage
<i>Dysoxylum gaudichaudianum</i> (A. Juss.) Miq. (Meliaceae)	Meda lasan	Wild	Leaf	Decoction	Drink
				Boil	Bath

<i>Elephantopus scaber</i> L. (Compositae)	Krau kidan	Wild	Leaf	Paste	Massage
<i>Eucaliptus alba</i> Reinw. (Myrtaceae)	Bubur	Wild	Leaf	Boil	Bath
<i>Eugenia</i> sp. (Myrtaceae)	Ai siba	Wild	Leaf	Boil	Bath
<i>Euphorbia nerifolia</i> L. (Euphorbiaceae)	Klatun dian	Wild	Stem	Boil	Bath
<i>Fatoua pilosa</i> Gaudich. (Moraceae)	Lorowen	Wild	Root	Decoction	Drink
<i>Ficus callosa</i> Willd. (Moraceae)	Salur	Wild	Bark	Decoction	Drink
<i>Ficus hispida</i> L.f. (Moraceae)	Baulenuk	Wild	Leaf	Decoction	Drink
				Paste	Cataplasm
<i>Ficus septica</i> Burm.f. (Moraceae)	Mamumus	Wild	Leaf	Paste	Massage
					Cataplasm
<i>Ficus virens</i> L. (Moraceae)	Hali	Wild	Leaf	Boil	Bath
<i>Flengimia macrophylla</i> (Wild.) Merr. (Fabaceae)	Sakiki mean	Wild	Leaf	Boil	Bath
<i>Garuga floribunda</i> Decne. (Burseraceae)	Feu	Wild	Bark	Decoction	Drink
				Paste	Massage
<i>Gossypium hirsutum</i> L. (Malvaceae)	Kabas fuan mean		Root	Decoction	Drink
				Paste	Massage
				Boil	Bath
<i>Grewia koodersiana</i> Burrett. (Tilliaceae)	Lenok	Wild	Root	Decoction	Drink
<i>Gynopetalum leucosticum</i> Miq. (Cucurbitaceae)	Kolokoan	Wild	Root	Decoction	Drink
<i>Hyptis suaveolans</i> (L.) Poit. (Asteraceae)	Ai dois metan	Wild	Leaf	Paste	Massage
				Boil	Bath
<i>Imperata cylindrica</i> (L.) P. Beauv. (Poaceae)	Hae manlain	Wild	Root	Decoction	Drink
<i>Indigofera suffruticosa</i> Mill. (Fabaceae)	Taun	Wild	Leaf	Decoction	Drink
				Boil	Bath
				Paste	Massage
<i>Jatropha curcas</i> L. (Euphorbiaceae)	Badut malaka mutin	Wild	Bark	Decoction	Drink
				Paste	Massage
				Boil	Bath
				Boil	Inhalation
<i>Jatropha gossypifolia</i> L. (Euphorbiaceae)	Badut malaka mean	Wild	Bark	Decoction	Drink
				Paste	Massage
<i>Lantana camara</i> L. (Verbenaceae)	Tateka	Wild	Leaf	Boil	Bath
<i>Macaranga tanarius</i> (L.) Mull. Arg. (Euphorbiaceae)	Tubi tahak	Wild	Leaf	Boil	Bath
<i>Melia azedarach</i> L. (Meliaceae)	Samer	Wild	Bark, leaf	Decoction	Drink
			Leaf	Paste	Massage
				Boil	Bath
<i>Melicope latifolia</i> (DC.) T.G. Hartley (Rutaceae)	Ai tahan tolu	Wild	Leaf	Paste	Massage
				Boil	Bath
<i>Melodorum fruticosum</i> Lour. (Annonaceae)	Ai leu lahat	Wild	Leaf	Paste	Massage
<i>Momordica balsamina</i> L. (Cucurbitaceae)	Bria fuik	Wild	Leaf, fruit	Juice, decoction	Drink
			Leaf	Paste	Massage
				Boil	Bath
<i>Morinda citrifolia</i> L. (Rubiaceae)	Nenuk	Wild	Leaf, fruit, bark	Decoction	Drink
<i>Moringa oleifera</i> Lam. (Moringaceae)	Ma'ut	Cultivated	Root	Paste	Massage
					Cataplasm
<i>Nauclea orientalis</i> (L.) L. (Rubiaceae)	Kafiru	Wild	Bark	Decoction	Drink
				Paste	Massage

<i>Neosalsmitra podagrica</i> Steenis (Cucurbitaceae)	Masin borat	Wild	Root, stem	Decoction, infusion	Drink
<i>Ocimum americanum</i> L. (Lamiaceae)	Silasi mean	Wild	Leaf	Paste in coconut oil	Massage
				Boil	Bath
<i>Ocimum basilicum</i> L. (Lamiaceae)	Silasi mutin	Cultivated	Leaf	Paste in coconut oil	Massage
<i>Operculina turpethum</i> (L.) Silva Manso. (Convolvulaceae)	Kaboen fuik	Wild	Leaf	Boil	Bath
<i>Phyllanthus niruri</i> L. (Phyllanthaceae)	Re nes	Wild	Whole plant	Decoction	Drink
<i>Phyllanthus reticulatus</i> Poir. (Phyllanthaceae)	Klan	Wild	Leaf	Paste	Massage
<i>Physalis angulata</i> L. (Solanaceae)	Babotore	Wild	Whole plant	Decoction	Drink
<i>Piper betle</i> L. (Piperaceae)	Fuik	Cultivated	Leaf	Paste	Massage
				Boil	Cataplasm
<i>Piper cubeba</i> L.f. (Piperaceae)	Kunus aleten	Wild	Leaf	Decoction	Drink
				Paste	Massage
<i>Pittosporum timorense</i> Blume. (Pittosporaceae)	Ai fet o	Wild	Bark	Paste	Massage
<i>Plumeria alba</i> L. (Apocynaceae)	Mukrin	Wild	Bark	Decoction	Drink
<i>Psidium guajava</i> L. (Myrtaceae)	Koya	Wild	Leaf	Boil	Bath
<i>Ruta angustifolia</i> Pers. (Rutaceae)	Aruda	Cultivated	Leaf	Paste in coconut oil	Massage
<i>Schleichera oleosa</i> (Lour.) Oken (Sapindaceae)	Sukabi	Wild	Leaf	Paste	Massage
				Boil	Bath
<i>Senna tora</i> (L.) Roxb. (Fabaceae)	Frasuk ten	Wild	Leaf	Boil	Bath
<i>Sesbania grandiflora</i> (L.) Poiret. (Fabaceae)	Kala mean	Wild	Leaf	Paste	Massage
				Boil	Bath
<i>Solanum lycopersicum</i> L. (Solanaceae)	Kaut	Wild	Leaf	Paste	Massage
				Boil	Bath
<i>Sterculia foetida</i> L. (Sterculiaceae)	Abano	Wild	Bark	Decoction	Drink
				Paste	Massage
<i>Strychnos ligustrina</i> Blume (Loganiaceae)	Bakumoru	Wild	Stem, bark	Decoction, infusion	Drink
			Leaf	Boil	Bath
<i>Swietenia macrophylla</i> King (Meliaceae)	Mahoni	Wild	Seed	Raw seed	Drink
<i>Syzygium aqueum</i> (Burm.f.) Alston (Myrtaceae)	Beko	Wild	Leaf	Boil	Bath
<i>Syzygium cumini</i> (L.) Skeels. (Myrtaceae)	Ai malae	Wild	Leaf	Paste	Massage
<i>Tabernaemontana pandacaqui</i> Lam. (Apocynaceae)	Lalitin mane	Wild	Bark, root	Decoction	Drink
			Leaf	Paste	Massage
<i>Tamarindus indica</i> L. (Fabaceae)	Sukaer	Wild	Leaf	Decoction	Drink
				Paste	Massage
				Boil	Bath
<i>Uvaria rufa</i> Blume (Annonaceae)	Koke lotu	Wild	Root	Decoction	Drink
<i>Vitex trifolia</i> L. (Lamiaceae)	Ai tatasik	Wild	Leaf	Paste	Massage
<i>Wendlandia burkilli</i> Cowan. (Rubiaceae)	Katimun	Wild	Bark	Decoction	Drink
				Paste	Massage
<i>Wrightia pubescens</i> R.Br. (Apocynaceae)	Lalitin fet o	Wild	Bark, root	Decoction	Drink
			Leaf	Paste	Massage
				Boil	Bath
<i>Zingiber officinale</i> Roscoe. (Zingiberaceae)	Masimanas kee	Cultivated	Rhizome	Paste	Massage

<i>Ziziphus timoriensis</i> DC. (Rhamnaceae)	Ai sisi	Wild	Leaf, bark	Decoction	Drink
			Bark	Paste	Massage
Not identified	Moat tiris	Wild	Leaf	Decoction	Drink
Not identified	Uas laomea	Wild	Tuber	Decoction	Drink

Conclusion

The practice of preventing and treating malaria in the traditional medicine of Tetun ethnic people is a direct implementation of their local knowledge about malaria. The local concept of signs and symptoms and the causes of malaria encourage traditional people to create methods to prevent and treat malaria. The local concept of the Tetun ethnic people about malaria is the main reference in the creation of rules regarding prohibitions and restrictions, and recommendations for preventing attacks of malaria. The local concept of the causes of malaria determines the choice of plants for the treatment of malaria. Scientifically, these plants have been proven to have activities as true antimalarial and indirect antimalarial. The local concept of malaria as a common, mild and harmless disease causes that the role of traditional healer is not always needed in the treatment of malaria. Methods for the prevention and treatment of malaria developed by Tetun ethnic people consist of both herbal and non-herbal methods and supported by the implementation of several prohibitions and restrictions to provide healing for the sufferers of malaria.

Acknowledgement

We thank to Indonesian Ministry of Research, Technology and Higher Education, for financial support (Research Contract No. 0668/K8/KM/2018).

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DOI: [10.32474/OAJCAM.2019.01.000121](https://doi.org/10.32474/OAJCAM.2019.01.000121)



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