

Effectiveness of Tahongai (*Kleinhosvia Hospita L.*) Leaf Extract in Killing Larvae *Anopheles sp.*

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Abstract— *Background:* Malaria is an infectious disease caused by malaria parasites, which is transmitted to humans through the bite of the *Anopheles sp.* This disease can attack all races, ages, and genders (Irianto, 2015). The method commonly used today to control mosquito larvae is through the use of chemicals such as abate (Ishak, Dom, Hussain, & Sabri, 2014). This can cause many problems such as insecticide resistance, revival of pest species, environmental pollution, toxic hazards to humans and other organisms. To overcome this problem, many use natural plant-based products as larvicides because they are a rich source of bioactive chemicals (Wahyuni, 2015). Utilization of medicinal plants (herbs) as traditional medicine is one of the efforts to improve the level of public health. The ingredients to make it can also be obtained in nature, are economical, and have no side effects like chemical drugs. One medicinal plant that is often used by people in Indonesia is Tahongai (*Kleinhosvia hospita L.*). **Purpose:** To identify the active compound activity of Tahongai Leaf (*Kleinhosvia Hospita L.*) extracts against larvae of *Anopheles sp.* **Method:** This type of research is experimental or experimental and the research design used is quasi experimental post test control group design, where each treatment is given a homogeneous condition so it is expected that there are no factors that affect the anti-larval activity of *Anopheles sp.* **Results:** Larvicidal activity of Tahongai extract (*Kleinhosvia hospita L.*) is a concentration of 0.5 mg / mL with 17 larvae mortality, 1 mg / mL concentration with 22 larvae mortality, concentration of 2 mg / mL larvae mortality of 25 tails, concentration 4 mg / mL with 25 larvae mortality, and at a concentration of 8 mg / mL larvae mortality as many as 25 larvae. **Conclusion:** Tahongai (*Kleinhosvia hospita L.*) extract has an active compound of larvaside which can kill *Anopheles sp.*

Keywords— Tahongai (*Kleinhosvia hospita L.*), Larva *Anopheles sp.*

I. INTRODUCTION

Malaria is an infectious disease caused by malaria parasites, which is transmitted to humans through the bite of the *Anopheles sp.* This disease can attack all races, ages, and genders (Irianto, 2015). The method commonly used today to control mosquito larvae is through the use of chemicals such as abate (Ishak, Dom, Hussain, & Sabri, 2014).

Malaria is an infectious disease that is a major health problem in the world, especially in tropical and subtropical countries in Africa, Central America, South America, several islands in the Pacific Ocean and the Caribbean, Southeast Asia (Gunawan, 2014). From 2009-2015 malaria including Extraordinary Events (KLB) always occur on the island of Borneo. In 2009, outbreaks were reported on the islands of Java (Central Java, East Java, Banten), Kalimantan, Sulawesi (West Sulawesi), Nangro Aceh Darussalam and Sumatra (West Sumatra, Lampung) with a total number of 1,869 patients and 11 deaths. (Yunita, 2016).

North Penajam Paser Regency, East Kalimantan, Particularly in the Sotek Puskesmas area, Penajam Sub-district, is still a malaria endemic, where on average every day the Puskesmas reports three to four residents both clinically and laboratory results positive for malaria. From the staff of the Malaria Control Program of the North Penajam Paser District Health Office, Sarjito Punco Waluyo, in Panajam, "the total number of malaria cases that occurred in North Penajam Paser District from January to October 2016 reached 500 cases" (Dinkes prov. Kaltim, 2016).

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such as insecticide resistance, revival of pest species, environmental pollution, toxic hazards to humans and other organisms. To overcome this problem, many use natural plant-based products as larvicides because they are a rich source of bioactive chemicals (Wahyuni, 2015).

Utilization of medicinal plants (herbs) as traditional medicine is one of the efforts to improve the level of public health. The ingredients to make it can also be obtained in nature, are economical, and have no side effects like chemical drugs. One medicinal plant that is often used by people in Indonesia is Tahongai (*Kleinhosvia hospita L.*). Tahongai has many uses from leaves, stems, and roots. Tahongai leaf is one of the plants in Indonesia, which leaves are traditionally used as medicine, including intestinal worms, wounds and scabies (Riarita, 2014). The compounds contained in Tahongai leaves are flavonoids which cause damage to cell wall permeability, alkaloids disrupt the constituent components of peptidoglycan on cells, and tannins damage cells by holding protein denaturation of these compounds so that Tahongai leaves can inhibit the growth of *Candida albicans* fungi. Asdyakasa's research (2013) showed that the ethanol extract of Tahongai leaves as an antibacterial against *Streptococcus mutans* showed a potential for minimum inhibitory concentration of 1.5% (Paramita, 2014).

Pharmacologically, Tahongai Leaf extract is known to have anti-mold, anti-yeast, anti-cancer, anti-tumor, and anti-oxidant activity. Antimicrobial activity of red galangal is reported to be higher than white galangal (Rialita, 2014). The effective or effective concentration of tahongai leaf extract to kill 50% and 90% of *Anopheles aconitus* larvae population is 4.4% and 5.1% (Rialita, 2014).

Tahongai leaves contain saponins, tannins, flavonoids, eugenols, basonin, galangal, and galangols (Herliana, 2013).

Flavonoids are the largest group of pure phenol compounds that have been available in nature. Flavonoids work as respiratory poisons. Flavonoids have a way of working that is by entering into the body of the larvae through the respiratory system which will then cause damage to the nerves and damage to the respiratory system and result in larvae unable to breathe and eventually die (Cania & Setyaningrum, 2013). Tannins as polyphenol compounds have antioxidant activity, tannins can reduce the ability to digest food in mosquito larvae by reducing the activity of digestive enzymes (protease and amylase) (Paradistya, 2015). Saponins can also irritate the digestive tract mucosa (Minarni, Armansyah, & Hanafiah, 2013).

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II. METHOD

This type of research is experimental or an experiment that aims to find out a symptom or effect that arises, as a result of certain treatments conducted by researchers of independent variables and then measure the effect or effect of the experiment on the dependent variable, namely knowing the difference in effect between the methods of extracting leaves Tahongai (*Kleinhosvia hospita L.*) which will be tested on *Anopheles sp.* Larvae. (Sastroasmoro S., 2011) The study design used was a quasi experimental post test control group design, where each treatment was given a homogeneous condition so that no factors were expected to affect the anti-larval activity of *Anopheles sp.* The population in this study was the leaves of Tahongai (*Kleinhosvia hospita L.*). The sample is a part of the chosen subject and is considered to represent the whole (Sumanto, 2014). The sample in this study was the Tahongai Leaf plant taken as many as 1000 grams in the City of samarinda, East Kalimantan. This sample is taken by means of purposive random sampling, which is based on the characteristics or characteristics of the population. The inclusion criterion was that the leaves of Tahongai (*Kleinhosvia hospita L.*) were still fresh, and not damaged. The exclusion criteria are wilting.

III. RESULTS

Based on the results obtained in the first repetition of larval mortality at a concentration of 0.5 mg / mL were 17 heads, larval death at a concentration of 1 mg / mL of 22 heads, larval death at a concentration of 2 mg / mL of 25 heads, larval death at a concentration 4 mg / mL of 25

animals, and larval death at a concentration of 8 mg / mL of 25 animals. The results of the second repetition obtained larvae mortality at a concentration of 0.5 mg / mL of 17 heads, larvae death at a concentration of 1 mg / mL of 22 heads, larval death at a concentration of 2 mg / mL of 25 heads, larvae death at a concentration of 4 mg / mL of 25 animals, and death of larvae at a concentration of 8 mg / mL of 25 animals. The results of the third repetition obtained larvae mortality at a concentration of 0.5 mg / mL of 18 heads, larvae death at a concentration of 1 mg / mL of 21 heads, larval death at a concentration of 2 mg / mL of 25 heads, larval death at a concentration of 4 mg / mL mL of 25 tails, and larval death at a concentration of 8 mg / mL that is 25 tails. Positive control of Levofloxacin larvae died by 25 birds, positive control abate first repetition 17, second repetition 16, third repetition 17 and negative control of dead larvae by 0 tails.

TABLE 1. Results of Tahongai leaves in killing larvae of *Anopheles sp.*

Concentration	Repetition			Number of Deaths Larvae	Average larval mortality	Percentage (%)
	I	II	III			
Control (-) Aquadest	0	0	0	0	0	0 %
Control(+) Levofloxacin	25	25	25	75	25	100 %
Control (+) Abate	17	16	17	50	17	68 %
0,5 mg/mL	17	17	18	52	17	68 %
1 mg/mL	22	22	21	65	22	88 %
2 mg/mL	25	25	25	75	25	100 %
4 mg/mL	25	25	25	75	25	100 %
8 mg/mL	25	25	25	75	25	100 %

IV. DISCUSSION



Figure 1. Examination of Tahongai leaves in killing larvae of *Anopheles sp.*

An increase in percent mortality of test larvae was in accordance with the increased concentration of Tahongai leaf extract which was exposed to the test larvae for 24 hours. Concentration of 0.5 mg/mL with 68% larval mortality as much as 68% of larvae, concentration of 1 mg/mL with 88% larval mortality of larvae, concentration of 2 mg/mL of larval mortality of 100% larvae, concentration of 4 mg/mL percent of mortality larvae as much as 100% larvae, and at a concentration of 8 mg/mL percent mortality of larvae as much as 100% larvae.

Based on the results obtained in a study which is then computerized using the one way Anova method, the value of the probability value (sig) is 0,000 <0.01 so that the hypothesis is accepted. Thus it can be concluded that the

leaves of Tahongai (*Kleinhosvia hospita* L.) can kill larvae of *Anopheles* sp.

According to Paramita, the 2016 Tahongai Plant or *K. hospita* is the only species in the genus *Kleinhovia*. According to Wahyuni Sry, Prasetyo Budi, 2017 Tahongai (*Kleinhosvia hospita* L.) is a shrub that grows naturally on the banks of rivers in East Kalimantan. Habitat Tahongai (*Kleinhovia hospita* L.) is located around the Mahakam river in East Kalimantan. Tahongai has medium stems, leaves that are soft and always green, where this plant began to be cultivated by some people in Kalimantan. Researchers have conducted research on the effectiveness test of Tahongai (*Kleinhovia hospita* L.) leaf extract in killing *Anopheles* sp. Larvae. with concentrations of 8 mg / mL, 4 mg / mL, 2mg / mL, 1 mg / mL, 0.5mg / mL. In Laboranmedic Balikpapan, researchers used *Anopheles* larvae placed in clear glass, each container filled with 200 ml of water and *Anopheles* sp larvae. as many as 25 individuals.

In Figure 2 the average mortality of *Anopheles* sp. which has been given with extract Tahongai (*Kleinhovia hospita* L.) with a concentration of 0.5 mg / mL with 17 larvae mortality, 1 mg / mL concentration with 22 larvae mortality, 2 mg / mL concentration of larvae death 25 tail, a concentration of 4 mg / mL with 25 larvae mortality, and at a concentration of 8 mg / mL larvae mortality as many as 25 larvae. The highest larval mortality occurs at concentrations of 2 mg / mL, 4 mg / mL, and 8 mg / mL, which is 25 larvae. According to (Darussalam, Nuryastuti, Mursiti, & Mustofa, 2015) an increase in extract concentration was also followed by an increase in the number of microbial deaths.

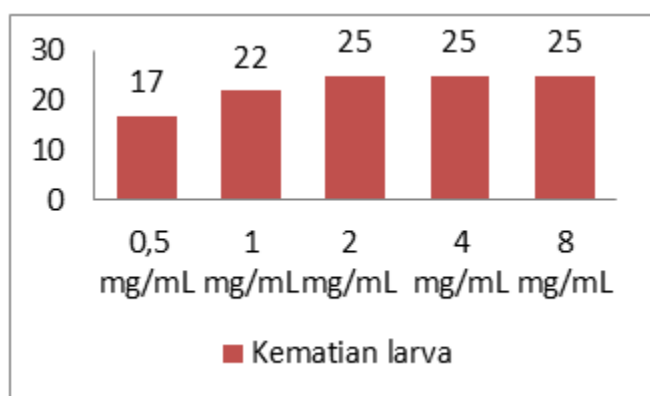


Figure 2. The average repetition results 3 times the activity of active compounds of red galangal in killing larvae of *Anopheles* sp

The death of larvae in this study was supported by research by Tri Fatmawati, Sri Ngabekti, 2014 that Tahongai (*Kleinhovia hospita* L.) contained saponins, tannins, flavonoids. Flavonoids work as respiratory poisons. Flavonoids have a way of working that is by entering into the body of larvae through the respiratory system which then causes damage to the nerves and damage to the respiratory system and results in larvae not being able to breathe and eventually die. And research (Cania & Setyaningrum, 2013) that tannins can interfere with mosquito larvae in digesting food because tannin will bind to proteins in the digestive

system that are needed by mosquito larvae for growth so that the process of absorption of protein in the digestive system becomes disrupted. Saponins can also irritate the digestive tract mucosa of mosquito larvae.

According to (Darussalam et al., 2015) lovofoxacin antibiotics are the third generation which is a new quinone group with the addition of atoms, fluorine in the quinolone ring. The flouorinolone class of antibiotics is still recommended because fluoroquinolone has a strong antimicrobial power. This is comparable to the trials of this study, namely the positive control of all larvae tested dead.

V. CONCLUSION

Tahongai extract (*Kleinhovia hospita* L.) has an active compound of larvaside which can kill larvae of *Anopheles* sp.

VI. OTHER RECOMMENDATIONS

For other researchers is needed on the effectiveness of the active compound Tahongai leaf (*Kleinhovia hospita* L.) in killing other mosquito larvae. For example it looks like a culex or mansonias mosquito larvae. For other researchers is needed regarding the pure compounds contained in the leaves of Tahongai (*Kleinhovia hospita* L.) as larvasides.

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