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Ethnomedical Study of Traditional Medicinal Plants for Cough and Tuberculosis (TB) of the Helong Tribe on Semau Island, Kupang Regency, East Nusa Tenggara

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ABSTRACT

The Helong people in Kupang Regency, NTT Province, have experienced being exposed to cough and tuberculosis (TB). Therefore, it is believed that this community has also long since developed their local knowledge and traditional ways to prevent and treat the disease. In general, this study aims to analyze and find the concept of the Helong Tribe community and ethnomedical practices for the prevention and treatment of cough and tuberculosis (TB). This research is a medical anthropology research using a qualitative research method with an ethnographic approach, which is supported by laboratory research and literature studies. Field research was carried out on Semau Island, NTT Province, involving traditional medicine. The results of the research conducted in the form of interviews with traditional medicine practitioners in the Helong tribe obtained as many as 31 plants used in treatment, and there were 3 plants used to treat cough, including hemorrhagic cough/tuberculosis, namely plants: white banyan (Ficus benjamina L), mesocarp palm fruit (Borassus flabellifer L.) and white flower (Clerodendrum costatum R.Br). The three plants that are suspected to have the ability to treat cough and cough up blood carried out preliminary tests of antibacterial activity against bacteria that generally cause stones, namely Staphylococcus aureus bacteria. The results obtained for ethanol extract of white banyan leaves (Ficus benjamina L) with a concentration of 25% b/v with a diameter of 16.53 mm, 50% b/v with a diameter of 16.33 mm, and 75% b/v with a diameter of 16.56 mm. Mesocarp ethanol extract of palm fruit (Borassus flabellifer L.) At a concentration of 25% b/v with an inhibitory zone diameter of 11.60 mm, a concentration of 50% b/v with an inhibitory zone diameter of 12.30 mm, a concentration of 75% b/v with an inhibitory zone diameter of 13.40 mm, for white flowers (Clerodendrum costatum R.Br) at a concentration of 25%b/v with an inhibitory zone diameter of 9.41 mm, a concentration of 50% b/v of 10.36 mm and a concentration of 75% b/v of 11.24 mm. This means that the three plants have antibacterial activity against Staphylococcus aureus bacteria. Furthermore, for the antibacterial activity test against Mycobacterium tuberculosis bacteria for white banyan plants (Ficus benjamina L.), mesocarp of palm fruit (Borassus flabellifer L.), and white flowers (Clerodendrum costatum R.Br) by the MODS (Microscopically Observed Drug Susceptibility) method, it was obtained that the three plants at concentrations of 250 ppm, 500 ppm, and 1000 ppm were only seen to have the growth of Micobacterium tuberculosis bacteria in the second week. Passive control with INH observation until week IV did not see any bacterial growth, while for negative control in the first week, the growth of Mycobacterium tuberculosis bacteria was seen. It can be concluded that a concentration greater than 1000 ppm is needed for the three plants to inhibit the growth of Mycobacterium tuberculosis bacteria.

Keywords: Ethnomedicine, *Staphylococcus aureus*, *Mycobacterium tuberculosis*, Tribe Helong

INTRODUCTION

Indigenous peoples have local knowledge about the use of plant resources. Traditional medicine with medicinal plant herbs has long been used by our ancestors. The reason people use traditional medicine is the expensive synthetic treatment and the possible side effects of chemical drugs in the long term.

The process of inheriting local science and technology of traditional medicine is mostly carried out orally, and the entry of modern culture into traditional society is feared to cause this local science and technology to erode (disappear) so that in its Development, many traditional medicine techniques are lost or forgotten. A very helpful first step to exploring local tribal knowledge is with various scientific approaches. One of them is with an ethnomedical approach. Some studies from various countries, for example, dandelion water extract, seaweed extract, sambiloto, orange, celery, artemisia plant, aloe vera, cinnamon, clang flower, guava, turmeric, cloves, and guava to treat Cough and Tuberculosis (TB) infections.

The Helong tribe is one of the indigenous ethnic groups that inhabit the area on Semau Island, Kupang Regency, East Nusa Tenggara. The Helong Tribe people have long used various kinds of plants and survived the attack of mild COVID-19 symptoms such as fever, cough, runny nose, strep throat, diarrhea, muscle pain, headache, conjunctivitis, and loss of taste or smell. There are medicinal plants that have been used by the Helong tribe for the prevention of cough and tuberculosis (TB) for generations by looking. The phenomenon of cough and tuberculosis (TB) cases in the Semau area is very small compared to other Kupang city areas; the cases of Cough and Tuberculosis (TB) in 2017 in Semau amounted to 420,000 cases.

The people of the Helong tribe are very dependent on the surrounding nature in utilizing medicinal plants by consuming traditional herbs accompanied by traditional rituals presented with betel nut as a sign of honor, when giving birth using the herb of the wood of the kusambi snake to refresh the body, most of them still use traditional herbs around the yard of the house such as moringa, white banyan, white flower leaves, mesocarp palm fruit flock, ende leaves, Paria, riksusu, bidara, guava, betel, betel nut, and other areca nuts as an increase in body stamina in the Helong tribal community in preventing cough and tuberculosis (TB) 68. In the initial survey of the study, there were 32 types of single medicinal plants and 10 herbs in 7 villages inhabited by the majority of the Helong tribe of Semau Island, so the researcher was interested in studying more deeply the practice of using medicinal plants to overcome cough and tuberculosis (TB) in daily life.

RESEARCH METHODS

Research Design

The research method used in this study is a qualitative method with an ethnographic approach. Ethnographic qualitative data collection is carried out in the field (field research, *field study*) by means of interviews, observations and documentation. To support the results of this qualitative research, laboratory research with a cutative approach and literature studies was carried out.

Data Source

Primary data is in the form of interviews with traditional healers/people who use medicinal plants and laboratory test results. Secondary data in the form of a literature review of medicinal plants

Data Collection Techniques and Instruments

Medicinal plant inventory data using questionnaires and antibacterial activity data in the form of laboratory results

Data Processing and Analysis

The data processing was descriptive, describing the results of the inventory of plants with special medicinal properties for the treatment of tuberculosis and the presence or absence of antibacterial activity against *Staphylococcus aureus* bacteria and *mycobacterium tuberculosis bacteria.*

RESULTS AND DISCUSSION

The results of the inventory of plants with medicinal properties of the Helong tribe community. Based on the results of interviews with traditional medicine practitioners (Pebatra) and the Helong tribe community of as many as 25 people, information was obtained that there are 32 types of diseases in general treated using medicinal plants taken both in the yard of the house and those that grow wild in the forest such as fever, diarrhea, toothache, cough, cough up blood, diabetes, hypertension, etc. The Helong tribe, which occupy Semau Island, generally have a farming and fishing livelihood. The area is dry and rocky, but there are still many plants that thrive, such as moringa, lontar, riksusu leaves, kesambi, kujawas, turmeric, ginger, shallots are the main producers of this area. Based on the results of interviews with traditional healers and people who often use plants for treatment, as many as 32 diseases are commonly treated using plants both around the house and growing wild in the forest.

Advocate (Persea americana Miller) and African (Vernonia amygdala Del.) are used to treat hypertension by decocting the leaves and drinking them. Aruda (Ruta graviolens) is useful for fever, and the leaves are squeezed and then pasted. Acid (Tamarindus indica) is useful for cleansing the blood after childbirth and promoting blood during menstruation. The fruit is boiled, and the water is drunk. Shallots (Allium cepa L) are used for colds; the tubers are ground and then applied, while garlic (Allium sativum) is used for fractures and cholesterol. The tubers are ground and pasted or chewed. Fruit star fruit (Averrhoa bilimbi L) is beneficial for lowering blood pressure, and the leaves are boiled and drunk. White banyan (Ficus benjamina L.) is used to treat coughs by decocting the leaves and drinking them. Benalu is used for cancer, with the whole part boiled and drunk. Balakacida (Chromolaena odorata) is beneficial for wounds, rheumatism, and stomach, and the leaves are boiled and drunk.

Binahong (Anredera cordifolia) copes with ambeyen, the leaves of which are boiled and drunk. Bidara (Ziziphus mauritiana) is useful for cancer, diarrhea, cough, cold, and insomnia. The leaves are boiled and drunk. Duck color (Kalanchoe pinata) is used for fever; the leaves are ground and pasted. Kapuk leaves (Ceiba petra) are useful for ulcers; the leaves are pounded and pasted. Ende leaves (Coccinia grandis L.) are used to treat itching and allergies, and the leaves are boiled with sour leaves and drunk. The leaves of the Arizona (Annona squamosa) cope with flatulence; the leaves are chewed and pasted. Faloak (Sterculia comosa Wallich.) is beneficial as a stimulant for childbirth and restoring stamina. The bark of the stem is boiled and drunk. Ganok/Dringo (Acorus calamus) is used to treat vomiting, and the root is boiled and drunk.

Ginger (Zingiber officinale) is useful for colds; the rhizomes are boiled and drunk. Red castor (Jatropha gossypifolia) is used for diarrhea and diarrhea, and the leaves are chewed and eaten. White jatropha (Jatropha curcas) is used for toothache and fever; the sap is tapped and pasted or applied. Lime (Citrus aurantiifolia) is used to treat coughs, and the fruit is squeezed, mixed with soy sauce, and drunk. Snakewood (Strychnos lucida) is useful for fever/malaria; the rough skin is cleaned, and the inside is boiled and drunk. Amethyst (Datura metal L.) is

used for asthma; the leaves are boiled and drunk. The cat's whiskers (Orthosiphon sp) are used for diabetes, and the leaves and flowers are boiled and drunk. Kujawas (Psidium guajava L.) is used for diarrhea. The shoots of the leaves are crushed and drunk. Kesambi (Schleichera oleosa) is used for toothache; the bark of the stem is boiled, and the water is used for gargling. Pecan (Aleurites moluccana L) is useful for nourishing hair; the seeds are ground and applied to it. Turmeric (Curcuma longa) is used for the stomach; the rhizome is boiled with honey and drunk. Chinese ketepeng is used to treat panu, scabies, and ringworm; The leaves are ground and applied/pasted. Lantoro/petes (Leucaena leucocephala) is used for worms, and the seeds are eaten raw. Japanese pumpkin (Sechium edule) is beneficial for high blood pressure, and the fruit is boiled and drunk. Mahogany (Swietenia mahagoni) is used for hypertension and malaria, and the seeds are chewed and eaten. Marungga (Moringa oleifera) is beneficial for increasing breast milk, hypertension, and blood sugar. The leaves are boiled and drunk. Marungga seeds are also used to nourish hair and overcome cholesterol, and they can be ground and applied or eaten. Male noni/white flower (Clerodendrum costatum R.Br.) is used for coughing up and coughing up blood, and the leaves are boiled and drunk. Meniran/love fruit (Phyllanthus niruri) is used to promote urination and bloating; The whole plant is boiled and drunk. Nutmeg (Myristica fragrans) is used to cleanse the blood after childbirth, and the seeds are boiled with acid and ginger and then drunk. Paria (Momordica charantia) is used to treat coughing up phlegm, and the leaves are squeezed, the water is drawn, and drunk. Papaya (Carica papaya) is used for fever and malaria; the leaves are boiled and drunk. Riksusu (Wrightia laevis) is used to relieve swelling, pain, and fractures. The leaves are crushed and then applied/pasted. Saboak/lontar (Borassus flabellifer L) is used for coughing up blood and deep heat, and the fruit is brewed with hot water, chewed, or eaten. Forest betel (Piper aduncum L.) is used to combat body odor, and its leaves are boiled and used for bathing. Green betel (Piper betel) is used to promote menstruation and vaginal discharge; the leaves are boiled and drunk. Soursop (Annona muricata L) is beneficial for hypertension, and the leaves are boiled and drunk. Lemongrass (Andropogon nardus) is used for coughing. The stem or all parts of it are boiled and drunk.

Results of the inventory of plants with medicinal properties to prevent cough and tuberculosis in the Helong tribe community on Semau island

Based on the results of interviews with traditional medicine practitioners (Pebatra) and the Helong tribe community of as many as 25 people, information was obtained that there are 32 types of diseases in general treated using medicinal plants taken both in the yard of the house and those that grow wild in the forest such as fever, diarrhea, toothache, cough, coughing up blood, diabetes, hypertension and there are as many as 45 types of plants used in treatment by the Helong tribe people on Semau Island. Knowledge about this treatment is acquired from generation to generation. However, not all family members have the talent and interest to learn this knowledge, so they often rely on shamans or petra. Gunawan (2004) stated that knowledge about medicinal plants is the nation's cultural heritage based on experiences that have been inherited by previous generations.

Parts of Medicinal Plants

The parts of the plant in question are medicinal plants in question are leaves, fruits, flowers, roots, rhizomes, stems (bark), tubers, and sap (resin). Leaves are the most widely used organs in traditional medicine by the Helong tribe people on Semau Island (53%) because the leaves are easiest to obtain in large quantities. Research conducted by Widiyastuti et al. (2018) stated that leaves could be harvested at any time without depending on the season and are easiest to process or concoct to treat a disease. The parts of the plant whose leaves are taken include noni, moringa, riksusu, white banyan, white flower, betel, Chinese keeping, cat's whiskers, sri kaya, color bebek, kapok leaves, and others. Medicinal plants whose fruits are taken are palm oil, lime, tamarindus (sour), and others. The part of the plant that is taken from

the sap is the distance of the fence. The parts of the plant that are taken from the seeds include candlenuts, petes, mahogany, and others. The parts of the plant where the rhizome is taken are ginger, dringo, and turmeric. The parts of the plant that are taken from the bulbs are onions and garlic.

Medicinal Plant Processing

The processing method that is often used by the people of the Helong tribe is boiled, mashed, squeezed, and chewed, and the most often used is by boiling by 62.22%. Processing by boiling is easy and cheap and can be done repeatedly; the ingredients can be drunk immediately and fresh; this method can also dissolve the active substances of the plant.

In terms of the use of herbs, a simple example is the Javanese herb sour turmeric, which is the rhizome of turmeric in its use as a medicinal ingredient must be mixed with acid. This is because the active substances in turmeric will be stable if they are found in an acidic environment (Limananti, 2003).

The Use of Plants as Medicine

The way to use plants as medicine used by the people of the Helong tribe is mainly to be drunk, eaten, applied, pasted, gargled, and bathed, and the most widely used is by drinking by 64.44%. Medicinal plants that are generally drunk include meniran, noni, forest series, cat whiskers, snakewood, eaten mahogany, red Latrobe, lamtoro/petes; dipoles are fence jatropha, / white jatropic, shallots, and others. The plants in the temple are duck color, kapok leaves, riksusu, Neruda, and others. The plant that gargles is kesambi, and the one that is used for bathing is forest betel.

Medicinal plants for the treatment of cough and hemorrhagic cough/tuberculosis

Tuberculosis is still one of the endemic diseases in NTT. The TB treatment process takes a long time, and the side effects of drugs are too high, so treatment using natural ingredients is still found in the community, especially in the Helong tribe on Semau Island. The results of interviews with traditional healers and people who often use traditional medicine found that there are 3 types of plants used to treat cough and cough up blood, namely white banyan (*Ficus benjamina* L.), lontar/soak *(Borassus flabellifer L).* White flower (*Clerodendrum costatum* R.Br.). These three plants may have properties to cure coughs and bloody coughs because they contain components of compounds that are suspected to be antibacterial, namely saponins, flavonoids, and alkaloids.

Results of identification of active compounds contained in plants with medicinal properties of the Helong tribe community for the treatment of cough and hemorrhagic cough/tuberculosis

The benefits of some plants as medicines are generally caused by the activity of compounds contained in these plants. These compounds are known as secondary metabolites. Secondary metabolites are produced by plants as a means of survival or as a means of self-defense. Some secondary metabolites are naturally contained in plants, there are also metabolites that are only formed when plants are contaminated from the environment (Salempa, P., 2014).

Identity testing is very important to find out substances or compounds that have pharmacological bioactivity effects from preparations or medicinal ingredients. Qualitative determination or testing can be carried out by phytochemical screening of secondary metabolite compounds (active compounds of plants) by using precipitation reactions and color reactions with certain reagent reactants or using chromatography methods.

Identification of active compounds of medicinal plants of the tribe of Helong is specifically carried out for plants that are suspected to be efficacious for the treatment of cough and hemorrhagic cough/tuberculosis using color reagents. Of the three plants used by the Helong tribe community, namely white banyan (*Ficus benjamina* L.) and lontar/soak *(Borassus flabellifer L.).* White flowers (*Clerodendrum costatum* R.Br.) all contain active compounds

that are the result of secondary metabolites such as alkaloids, tannins, and flavonoids. The table of identification results can be seen in Table 2.

Extracts from the mesocarp of palm fruit, white banyan leaf, and white flower leaf were tested for the content of saponins, tannins, alkaloids, flavonoids, and terpenoids using various chemical reactions. The saponin test was carried out by mixing 0.1 grams of extract with 10 ml of aquades, heated, cooled, and vigorously shaken. The positive results were indicated by the formation of stable foam, which was seen in all three extracts. For the tannin test, the extract was added with 3 drops of 1% FeCl3, and the positive result was characterized by the formation of a blackish-green color, which also occurred in all extracts. The alkaloid test was carried out by adding Wagner reagent to the extract, where the positive result was shown by the formation of brown deposits in all three samples. In the flavonoid test, the extract was mixed with 1 ml of hot ethanol, magnesium powder, and concentrated HCl and tested with NaOH, which showed positive results with a color change from light green to reddish green in all samples. Finally, the terpenoid test was performed by dissolving the extract in chloroform, concentrated acetic acid, and concentrated sulfuric acid, resulting in a brownish ring that showed positive results in all the extracts tested.

The benefits of some plants as medicines are generally caused by the activity of compounds contained in these plants. These compounds are known as secondary metabolites. Secondary metabolites are produced by plants as a means of survival or as a means of self-defense. Some secondary metabolites are naturally contained in plants, and there are also metabolites that are only formed when plants experience contamination from the environment.

Identification of active compounds contained in a plant extract can be done, with color reagents, identification of active compounds suspected to be contained in ethanol extracts of palm fruit, white banyan leaves and white flower leaves which are antibacterial are saponins, tannins, flavonoids, terpenoids and alkaloids. The results of the tests carried out can be seen in the table below.

Results of the test of antibacterial activity of medicinal plants efficacious as a cough and cough medicine with phlegm/tuberculosis against *staphylococcus aureus bacteria*

Plants with medicinal properties for the treatment of cough and cough with phlegm used by the Helong tribe community were found in 3 types of plants, namely banyan puti, white flowers and palm fruits, the three plants were made into thick extracts with ethanol solvents with concentrations of 25% b/v, 50% b/v and 75% b/v.

The antibacterial activity of a medicinal plant is characterized by the presence of a clear area (zone) around the cylinder, In this test, the ethanol extract of white banyan leaf showed the presence of antibacterial activity against the growth of staphylococcus aureus bacteria seen in table 3.

Table 3. Results of Measurement of Inhibition Zones of White Banyan Leaf Ethanol Extract Against *Staphylococcus aureus* Bacteria with Concentrations of 25% b/v, 50% b/v and 75% b/v.

Treatment	euterono my			Sum	Average (mm)	Deviation
	I	II	III			
Control	0,00	0,00	0,00	0,00	0,00	0,00
25% B/V	44,4	16,3	18,9	49,6	16.33 mm	
50% B/V	14,1	16,3	18,5	48,9	16, 53 mm	

75% B/V					
	14,8	16,7	18,2	49,7	16.56 mm

(Source: Primary research data 2023)

Table 4. Results of Measurement of Ethanol Resistance Zones of White Flower Leaf Ethanol Extract Against *Staphylococcus aureus* Bacteria with Concentrations of 25% b/v, 50% b/v and 75% b/v.

Treatment	Replication			Sum	Average (mm)	Deviation
	I	II	III			
Control	0,00	0,00	0,00	0,00	0,00	0,00
25% B/V	9,42	9,17	9,63	28,22	9,41	
50% B/V	9,96	10,62	10,51	31,09	10,36	
75% B/V	11,24	10,96	11,52	33,72	11,24	

(Source: Primary research data 2023)

Table 5. Results of Measurement of Inhibition Zone of Mesocarp Ethanol Extract of Palm Fruit Against the Growth of *Staphylococcus aureus* Bacteria with Concentrations of 25% b/v, 50% b/v and 75% b/v.

Treatment	Replication			Sum	Average (mm)	Deviation
	I	II	III			
Control	0,00	0,00	0,00	0,00	0,00	0,00
25% B/V	11,5	11,9	11,5	34,90	11,63	
50% B/V	12,2	12,6	12,2	37,00	12,33	
75% B/V	13,3	13,7	13,3	40,30	13,43	

(Source: Primary research data 2023)

Results of the test of antibacterial activity of medicinal plants efficacious as a cough and cough medicine with phlegm/tuberculosis against bacteria *Mycobacterium tuberculosis.* Testing of antibacterial activity of several ethanol extracts of palm fruit mesocarp (*Borassus flabellifer* L.) against test bacteria *Mycobacterium tuberculosis* as listed in the following Table.

Table 6. Results of Measurement of White Banyan Ethanol Extract Resistance Zone Against *Mycobacterium tuberculosis Bacteria* with Concentrations of 250 ppm, 500ppm, and 1000ppm

Observation	Treatment				
	250 ppm	500 ppm	1000 ppm	H	Negative control
Week I	-	-	-	-	-
Week II	+	+	+	-	+
Week III	+	+	+	-	+

(Source: Primary research data 2023)

Table 7. Results of Measurement of Resistance Zones of White Flower Leaf Ethanol Extract Against *Mycobacterium tuberculosis Bacteria* with Concentrations of 250 ppm, 500 ppm, and 1000 ppm.

Observation	Treatment				
	250 ppm	00 ppm	1000 ppm	H	gative control
Week I	-	-	-	-	-
Week II	+	+	+	-	+
Week III	+	+	+	-	+

(Source: Primary research data 2023)

Table 8. Results of Measurement of Resistance Zones of Mesocarp Ethanol Extract of Palm Fruit Against *Mycobacterium tuberculosis Bacteria* with Concentrations of 250 ppm, 500 ppm, and 1000 ppm.

Observation	Treatment				
	250 ppm	500 ppm	1000 ppm	H	gative control
Week I	-	-	-	-	-
Week II	+	+	+	-	+
Week III	+	+	+	-	+

(Source: Primary research data 2023)

Results of the test of antibacterial activity of medicinal plants efficacious as a cough and cough medicine with phlegm/tuberculosis against *staphylococcus aureus bacteria*

Testing for antibacterial activity is an initial step to obtain scientific evidence in the Development of traditional medicines related to the ability of a medicinal plant to inhibit bacterial growth.

The results of the antibacterial activity test of ethanol extract of white banyan leaf showed that at a concentration of 25%, the average diameter of the inhibition zone was 16.33 mm, the concentration of 50% was 16.53 mm, and at the concentration of 75% was 16.56 mm. This proves that ethanol extracts with concentrations of 25% b/v, 50% b/v, and 75% b/v are able to inhibit the growth *of Staphylococcus aureus* bacteria with a large resistance area range of 10-20 mm. Davis and Stout (1971) and Dewi (2010) grouped the strength of antibacterial power based on the resistance area; namely, the resistance area of >20 mm is in the very strong category, the resistance area of 10-20 mm is in the strong category, the resistance area of 5-10 mm is in the medium category, and the resistance area of <5 mm is in the weak category. Based on this determination, the white banyan leaf extract is classified as a strong category.

The results of the antibacterial activity test of ethanol extract of palm fruit mesocarp showed that at a concentration of 25%, the average diameter of the inhibition zone was 9.41 mm, the concentration of 50% was 10.36 mm, and at the concentration of 75% was 10.24 mm. This proves that ethanol extracts with concentrations of 25% b/v, 50% b/v, and 75% b/v are able to inhibit the growth *of Staphylococcus aureus* bacteria where it can be seen that at a concentration of 25% of the strong category, the concentration of 50% and 75% is in the strong category.

The results of the antibacterial activity test of white flower ethanol extract showed that at a concentration of 25%, the average diameter of the inhibition zone was 11.63 mm, the concentration of 50% was 12.33 mm, and at the concentration of 75% was 13.43 mm. This proves that ethanol extracts with concentrations of 25% b/v, 50% b/v and 75% b/v are able to inhibit the growth *of Staphylococcus aureus* bacteria with strong categories.

The ability of white banyan plants (*Ficus benjamina* L.), lontar/soak *(Borassus flabellifer L)*, and white flowers (*Clerodendrum costatum* R.Br.) to inhibit the growth of strong category bacteria are possible due to the presence of active substances contained in the three plants, namely saponins, flavonoids, and colloids. Saponin compounds have an activity as an antibacterial by damaging the bacterial cell membrane with damage to the cell membrane, which will cause the cell to die. (Hasibuan, 2016). Alkaloids work in inhibiting bacterial growth by disrupting the peptidoglycan component in bacterial cells, which makes the cell wall not fully formed and causes death (Ajizah, 2004). The mechanism of action of flavonoids as antibacterial compounds is divided into 3, namely inhibiting nucleic acid synthesis, inhibiting cell membrane function, and inhibiting energy metabolism (Nuria *et al.,* 2009).

Results of the test of antibacterial activity of medicinal plants efficacious as a medicine for cough and cough with phlegm/tuberculosis against *Mycobacterium tuberculosis* bacteria.

Testing of antibacterial activity against *Mycobacterium tuberculos*is bacteria using the MODS (*Microscopic-observed drug susceptibility assay*) method is a culture method for *M. tuberculosis* germs with *Middlebrook* 7H9 media which can also detect TB drug sensitivity microscopically. The sensitivity test was facilitated with *Middlebrook* 7H9 plus anti-TB drugs. The MODS method has a higher sensitivity compared to other culture methods and can detect faster growth of *M. tuberculosis* at a relatively lower cost and in an easy way (Dewi, 2011). The time required to arrive at confirmation of results was 7 days (MODS), 13 days (automated technique), and 26 days (L-J culture). The time to drug sensitivity results was 7 days (MODS), 22 days (automated technique), and 68 days (L-J culture) (Caviedes & Moore, 2007).

Testing the antibacterial activity of Tuberculosis strain H37RV of medicinal plants with medicinal properties using the MODS method, this screening test was carried out to find out whether the medicinal plant could inhibit microbial growth by observing the growth of bacteria (cord) in the well in the plate by making different concentrations, namely 250, 500 and 1000 ppm.

Testing of the antibacterial activity of white banyan extract (*Ficus benyamina*) was obtained after incubation for 7 days, which showed that the negative control (-) with treatment + 50 µl DMSO + 950 µl of media + *Mycobacterium tuberculosis* was seen with bacterial growth that was widely seen on microscopic observation, for positive control (+) with treatment + 50 µl ddH2O + isoniazid drug + 950 µl of media + *Mycobacterium tuberculosis* there is no bacterial growth at all. White banyan leaf ethanol extract with concentrations of 250 ppm, 500 ppm, and 1000 ppm still showed no bacterial growth. On the 8th day, there was only bacterial growth at concentrations of 250 ppm and 500 ppm, while at a concentration of 1000 ppm, there was only bacterial growth on day 11, and for positive control, there was still no bacterial growth on the 22nd day of observation. This means that a concentration of white banyan leaf ethanol extract greater than 1000 ppm is needed to inhibit the growth of *Mycobacterium tuberculosis bacteria.*

The testing of antibacterial activity of ethanol extract of mesocarp palm *fruit (Borassus flabellifer L)* was obtained after incubation for 7 days, which showed that the negative control (-) with treatment + 50 µl DMSO+ 950 µl of media + *Mycobacterium tuberculosis* was seen bacterial growth that was widely seen on microscopic observation, for the positive control (+) with treatment + 50 µl ddH2O + isoniazid drug + 950 µl of media + *Mycobacterium tuberculosis* there is no bacterial growth at all. Mesocarp ethanol extract of palm fruit at

concentrations of 250 ppm, 500 ppm, and 1000 ppm still showed no bacterial growth. On the 8th day, there was only bacterial growth at concentrations of 250 ppm and 500 ppm, while at a concentration of 1000 ppm, there was only bacterial growth on day 11, and for positive control, there was still no bacterial growth on the 22nd day of observation. This means that the concentration of ethanol extract of palm fruit mesocarp needs to be greater than 1000 ppm in order to inhibit the growth of *Mycobacterium tuberculosis bacteria.*

Testing of the antibacterial activity of white flower extract (*Clerodendrum costatum* R.Br.) obtained after incubation for 7 days, which showed that the negative control (-) with treatment + 50 µl DMSO + 950 µl media + *Mycobacterium tuberculosis* was seen bacterial growth that was widely seen on microscopic observation, for positive control (+) with treatment + 50 µl ddH2O + isoniazid drug + 950 µl media + *Mycobacterium tuberculosis* there is no bacterial growth at all. White banyan leaf ethanol extract (*Ficus benyamina*) concentrations of 250 ppm, 500 ppm, and 1000 ppm were still seen in the absence of bacterial growth. On the 8th day, there was only bacterial growth at the concentrations of 250 ppm and 500 ppm, while the concentration of 1000 ppm was only seen on the 11th day, and for positive control, there was still no bacterial growth on the 22nd day of observation. This means that a concentration of ethanol extract from white flower leaves is needed greater than 1000 ppm in order to inhibit the growth of *Mycobacterium tuberculosis bacteria.*

CONCLUSION

There are as many as 45 plants with medicinal properties that are used to treat 32 types of diseases. The most widely used plant part is leaves at 53%, the most commonly used processing method is boiling at 62.22%, and the way of use is drinking, which is 64.44%. Plants that are efficacious in the treatment of tuberculosis are white banyan (*Ficus benjamina* L.), palm/soak *(Borassus flabellifer L)*, and white flower (*Clerodendrum costatum* R.Br.). The antibacterial activity of white banyan leaf ethanol extract (*Ficus benjamin*) at a concentration of 75% was 16.56 mm in the strong category, the ethanol extract of mesocarp of palm fruit (*Borassus flabellifer* L) at a concentration of 75% was 10.24 mm and the ethanol extract of white flower (*Clerodendrum costatum* R.Br.) at a concentration of 75% was 13.43 mm. Concentrations greater than 1000 ppm are needed for ethanol extract of white banyan mesocarp (*Ficus benjamina* L.), ethanol extract of palm mesocarp/soak *(Borassus flabellifer L)*, and white flower ethanol extract (*Clerodendrum costatum* R.Br.) to inhibit the growth of *Mycobacterium tuberculosis bacteria.*

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