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Ethnobotanical Survey Phytochemical and Antimicrobial Screening on Temiar Community at Kg. Husin, Jalong Tinggi, Sungai Siput (U), Perak West Malaysia

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ABSTRACT

This ethnobotanical study was aimed at exploring the potential medicinal plants in treating diseases and illnesses among the users from Temiar community, Kampong Husin Jalung Tinggi Sungai Siput (U), Perak. This study employed qualitative interview research design. Traditional practitioners or Tok Batin were interviewed to gather information about the local name, part used, mode of preparation and medicinal uses of medicinal plants. A total of 18 medicinal plants collected in this survey were categorized into herbs, tree, shrub and fern. Leaves and roots were found to be the most frequent used plant part and decoction (boiled with water) was the major form of preparation. In most cases preparation are either administered orally or applied topically. Antibacterial activity was tested using Kirby-Bauer (KB) method. The most of plants species inhibit growth of Staphylococcus aureus with diameter of inhibition in range of 7-15 mm, whereas no inhibition against another species of microbes except for Agathis borneensis. A number of phytochemicals were also found to be present with phenolics being the most abundant followed by alkaloids, flavonoids and saponins.

Keywords: Ethnobotanical survey, Temiar community, Antimicrobial, Phytochemical screening

INTRODUCTION

Mostly of ethnic groups in Malaysia depend on plant resources mainly as herbal medicines, food. Their practice to treat diseases using plants becomes an aspect to be more interesting for investigation. Tok Batin (Head of Tribe), the most knowledgeable among them will be passed it from generation to generation in the verbal form. Unfortunately, nowadays the younger generations are preferably to use modern medicine compared to folk medicine. This phenomenon causes a lack of knowledge on traditional herbal remedy among them. It will be worsening if many young people migrate to urban area for education and job. In addition, a few literatures are available regarding the medicinal uses of herbal plant by this indigenous/aboriginal community [1]. Thus, there is an opportunity to explore their practice of usage of herbal plants for traditional remedy.

According to Center for Orang Asli Concerns [2] there are total of 248 indigenous community villages around Perak that are consisting of various sub ethnic groups [3] stated that Temiar sub ethnic group is the second majority of indigenous community in Perak that are fully depend on plant resources. The phytochemical research based on ethnobotanical information is considered an effective approach in the discovery of new anti-infective agents from plants [4]. The general screening such as antimicrobial assay was chosen as the simple, cheap and fast *in vitro* bioassay.

MATERIALS AND METHODS

Ethnobotanical survey

The study area was located in Kg. Husin, Jalong Tinggi, Sungai Siput (U), Perak West Malaysia. Prior to beginning of our research, appropriate permission was obtained from Perak Forestry Department. Data were gathered by interviewing Tok Batin (Head of Tribe) in order to identify local name, part used, medicinal uses and placed collected of the herbal plants.

Collection of plant material

The collected plant for treatment of diseases after carrying out the survey by use questionnaires and interviewing Tok batin were collected from Kampung Husin, Jalong Tinggi, Sungai Siput (U) Perak West Malaysia. The taxonomic identities of the plants were identified by senior taxonomist at University Putra Malaysia Kuala Lumpur Malaysia.

Antimicrobial screening

Agar spread method

The isolated from total of 18 medicinal plants were screened for their antibacterial activity using Kirby-Bauer (KB) method against *Klebsiella pneumonia* (ATCC-25852), *Shigella sonnei* (ATTC-25931), *Escherichia coli* (ATCC-25922), *Staphylococcus aureus* (ATTC-25923) and *Candida albicans* (ATTC-10231). In this test, bacteria culture solutions contain turbidity standard of 0.5 × 106 CFU/ml prepared in normal saline and spread on sterile Mueller Hinton agar plates using spread plate technique. Then discs containing different isolates were placed on an agar plate where the selected bacteria were grown. A sterile blank disc containing Dimethyl Sulfoxide (DMSO) was used as negative control and ciprofloxacin (20 µg/ml) as positive control. The plates were than incubate for 24 h at 37°C. After incubation, the zone of inhibition was recorded. The experiment was repeated three times.

Phytochemical screening

Qualitative phytochemical analysis of the crude extracts of the plants collected was determined by the methods screening [5-7].

Test for alkaloids

Wagner's test: To the 1 ml of extract added to 2 ml of Wagner's reagent Iodine in potassium iodide, formation of reddish brown precipitate indicates the presence of alkaloids.

Phenolic compounds: Test for Flavonoids: The extract is treated with NaOH, formation of yellow colour indicates the presence of flavones. Phenolic presence was determined by taking few drops of 1% FERRIC chloride, a blue/violet/purple indicated the presence of phenol.

Test for saponins: Saponins were determined by the frothing test method [8] where 0.5 ml of the filtrate was mixed with 5 ml distilled water. Frothing persistence indicated presence of saponins.

RESULTS

Ethnobotanical survey

A total of 18 medicinal plants used by the community were collected and studied after carrying out simple interviews. The species belonged to different families as presented in Table 1. There was no predominant family in terms of the species of the medicinal plants collected. The herbal practitioners' harvests various parts like the bark, whole plant and leaves. The roots and leaves were found to be the most common part harvested.

Table 1: Plants used by Temiar Community in Kampung Husin, Jalong, Tinggi, Sungai, Siput (U) Perak State of West Malaysia

Botanical family	Botanical name	Local name	Parts used	Medicinal use/Diseases treated
Annonaceae	*Pseuduvaria macrophylla* (Olive.) Merr. var. machrophylla	Kayu tas	Trunk	Used to expel the animal
Araceae	*Homalomena sagittifolia* Jungh. ex Schott var. sagittifolia	Kawok	Roots, Tuber, Leaves	Roots and tuber are used for poison bites. Leaves are used to speed up recovery for women
Araucariaceae	*Agathis borneensis* Warb.	Raja kayu		For diabetic and hypertension
Begoniaceae	*Begonia barbellata* Ridl.	Kayang	Leaves	Leaves are boiled with water and applied on the cloth to wrap injury and broken bone.
Dryopteridaceae	*Tectaria singaporeana* (Hook. & Grev) Copel	Misai Adam	Roots	Roots are boiled with water and drink once a day to relieve back pain
Euphorbiaceae	*Baccaurea lanceolate* (Miq.) Mull. Arg.	Buah Tahe	Fruits	Fresh fruit are chewed for energy
Gesneriaceae	*Cyrtandra cupulata* Ridl. var cupulata	Hanglup	Roots, leaves	Roots and leaves are boiled and applied on skin to relieve numbness
Graminae	*Lophatherum gracile* Brongn.	Ubi Jaga	Tuber	Roots and leaves are boiled and drink for male energy
Guttiferae	*Garcinia scortechinii* King	Chedrod	Roots, leaves	Roots and leaves are boiled and drink or applied on leg of toddler to improve their movement.
Lauraceae	*Cinnamomum sintoc* Blume	Kayu Rempah		Used as cooking ingredient
Melastomataceae	*Sonerila barbata* Ridl.	Akar patek	Leaves	Leaves are boiled with water and applied on skin to relieve inflammation and injury
Myrsinaceae	*Labisia pumila* (Blume) Fern-Vill var. alata Scheff.	Kacip fatimah	Roots, Leaves	Roots and leaves are boiled with water and drink for post-natal women
Pentaphragmatacea	*Pentaphragma begoniifolium* (Roxb. ex jack) Wall. ex G. Don	Sayur salang	Leaves	Young leaves are eaten as vegetable for well-being paste of leaves are used as abortifacient.
Rubiaceae	*Rennellia elliptica* Korth.	Sam-sam	Leaves	Leaves are boiled and drink for male energy
Rubiaceae	*Uncaria sp.*	Kadoda	thrunk	Exudates from trunk are drink for diarrhea
Simaroubaceae	*Eurycoma longifolia* Jack	Tongkat Ali	Roots, leaves	Roots and leaves are boiled and drink for male energy
Smilacaceae	*Smilax calophylla* Wall. ex A.DC	Rancang besi	All parts	Boiled with water and drink to relieve back pain
Tacaceae	*Tacca integrifolia* Ker Gawl.	Misau Rimau	Tuber, Leaves	Tuber and leaves are boiled with water and drink once a day to relieve back pain

Antimicrobial screening

The antimicrobial activities of 18 plant species were screened for their antimicrobial spectrum. The test bacteria used for screening were 5 bacterial cultures. Table 2 summarizes the average microbial growth inhibition of the methanol extracts. From the findings it was observed that the most of plants species inhibit growth of *Staphylococcus aureus* with diameter of inhibition in range of 7-15 mm, whereas no inhibition against another species of microbes except for *Agathis borneensis*. Another four plants extract cannot be tested due to small quantity of extract

available.

Table 2: Antimicrobial Screening

Plants species	Part of plant	Diameter of inhibition (mm)				
		Klebsiella pneumoniae	***Shigella sonnei***	***Escherichia coli***	***Staphylococcus aureus***	***Candida albicans***
Agathis borneensis Warb.	Stem	–	–	7.0	9.3	–
Cinnamomum sintoc Blume	Leaves	–	–	–	–	–
Cinnamomum sintoc Blume	Stem	–	–	–	7.45	–
Cyrtandra cupulata Ridl. var cupulata	Leaves	–	–	–	–	–
Eurycoma longifolia Jack	Leaves	–	–	–	10.48	–
Garcinia scortechinii King	Leaves	–	–	–	13.53	–
Labisia pumila (Blume) Fern-Vill var. alata Scheff.	Leaves	–	–	–	8.15	–
Labisia pumila (Blume) Fern-Vill var. alata Scheff.	Stem	–	–	–	11.45	–
Pentaphragma begoniifolium (Roxb. ex jack) Wall. ex G. Don	Leaves	–	–	–	8.27	–
Pentaphragma begoniifolium (Roxb. ex jack) Wall. ex G. Don	Root	–	–	–	7.63	–
Pseuduvaria macrophylla (Olive.) Merr. var. machrophylla	Leaves	–	–	–	9.18	–
Rennellia elliptica Korth.	Root	–	–	–	–	–
Sonerila barbata Ridl.	Leaves	–	–	–	–	–
Sonerila barbata Ridl.	Root	–	–	–	8.85	–
Tacca integrifolia Ker Gawl.	Leaves	–	–	–	14.97	–
Tectaria singaporeana (Hook. & Grev) Copel	Leaves	–	–	–	6.93	–
Tectaria singaporeana (Hook. & Grev) Copel	Root	–	–	–	11.33	–
Uncaria sp.	Stem	–	–	–	9.55	–
Ciprofloxacin (Positive control)		28.01	27.73	29.02	28.61	NA
Negative control (DMSO)		–	–	–	–	–

Key: – = Absent; NA = Not applicable

Phytochemical screening

Various phytochemicals were screened for their presence in the medicinal plants used by the Temiar community as summarized in Table 3. The tested phytochemicals were alkaloid, flavonoid, phenolic and saponin. Phenolic were found to be the most common phytochemical in the 13 sample extracts. Alkaloid were found in the extract of *Labisia pumila* (Blume) Fern-Vill var. alata Scheff (Stem), *Tectaria singaporeana* (Hook. & Grev) Copel (root) and *A. borneensis* Warb (Stem). Flavonoids also were found in the extract of *Cyrtandra cupulata* Ridl. var cupulata (leaves), *Garcinia scortechinii* King (leaves) and *A. borneensis* Warb (Stem). *T. singaporeana* (Hook. & Grev) Copel (root) was only found to possess saponin among the screened phytochemicals. *T. sinaporeana* (Hook. & Grev) Copel (root) presence alkaloid, phenolic and saponin, *A. borneensis* Warb (Stem) presence alkaloid, flavonoid and phenolic.

Table 3: Phytochemical screening

Sample of plants	Part of plants	Alkaloids	Flavonoids	Phenolics	Saponins
Agathis borneensis Warb.	Leaves	–	–	–	–
Agathis borneensis Warb.	Stem	+	+	+	–
Cinnamomum sintoc Blume	Leaves	–	–	+	–
Cinnamomum sintoc Blume	Stem	–	–	+	–
Cyrtandra cupulata Ridl. var cupulata	Leaves	–	+	+	–
Eurycoma longifolia Jack	Leaves	–	–	+	–
Garcinia scortechinii King	Leaves	–	+	+	–
Labisia pumila (Blume) Fern-Vill var. alata Scheff.	Leaves	–	–	+	–
Labisia pumila (Blume) Fern-Vill var. alata Scheff.	Stem	+	–	–	–
Pentaphragma begoniifolium (Roxb. ex jack) Wall. ex G. Don	Leaves	–	–	+	–
Pentaphragma begoniifolium (Roxb. ex jack) Wall. ex G. Don	Root	–	–	–	–
Pseuduvaria macrophylla (Olive.) Merr. var. machrophylla	Leaves	–	–	–	–
Sonerila barbata Ridl.	Leaves	–	–	–	–
Sonerila barbata Ridl.	Root	–	–	+	–
Tacca integrifolia Ker Gawl.	Leaves	–	–	+	–
Tectaria singaporeana (Hook. & Grev) Copel	Leaves	–	–	+	–
Tectaria singaporeana (Hook. & Grev) Copel	Root	+	–	+	+
Uncaria sp.	Stem	–	–	+	–

Key: + = Present; – = Absent

DISCUSSION

Eighteen medicinal plants from different families used by Temiar community were identified after carrying out the ethnobotanical survey. It was clear that the community harvest the leaves, and roots/stem, but the part that is used most was found to be the leaves, is a reason why medicinal plants are becoming scarce. Hence, good conservation measures should be encouraged among communities and traditional healers.

Most of the extract had substantial inhibitory abilities on the growth of the tested cultures. The activity was more Gram-positive test culture (*S. aureus*), only *Ag. borneensis* Warb had antimicrobial activity both in the Gram-positive and Gram-negative *T. integrifolia* Ker. Gawl (14.97 mm) are among the extracts that produces a higher inhibitory activity against the *Staphylococcus aureus*. The different rates of inhibition could probably be due to the quantity of the phytochemical compounds present in the extracts. However, other three extract showed no activity against some of the test like *C. cupulata* Ridl. var cupulata, *R. elliptica* Korth and *S. barbata* Ridl. This can be due to the antagonist is activity of the various phytochemical that may be present in the extract and such a plant may not offer alternative Medicare against such disease caused by the organisms [9].

Among the phytochemicals screened for phenolics were found to be abundant followed by the flavonoids, the alkaloids and the saponins. These clearly demonstrates the reason as to why the community use more than one plant to make a concoction for the treatment of a given disease since they can have some additive or synergistic activity against the pathogens of interest [9]. The plants study here can be seen as a potential source of useful drugs.

CONCLUSION

The findings of the study may be helpful to the future investigators on these plants in order to isolate, identify, characterize and elucidate the structure of the bioactive compounds. The antimicrobial activities of these plants for the treatments of the diseases as claimed by traditional healers are also being investigated.

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