Ethnomedical Survey of Aborigines Medicinal Plants in Gua Musang, Kelantan, Malaysia

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ABSTRACT: The practice of herbal medicine had been diminishing, which may lead to the loss of valuable information about healing herbs. Therefore, an ethnomedical analysis was carried out in order to document the traditional medicinal uses of plants, which are commonly used among the Kelantanese Aborigines. A detailed systematic exploration of traditional ethnobotanical knowledge of medicinal plants of rural area in Kelantan was carried out mainly through interviews among aboriginal households (house-to-house interviews) and traditional healers. A total of 46 species was identified as having potential medicinal efficacy in curing different diseases and illnesses. Findings from this study can be used as a pharmacological basis in selecting plants for further phytochemical and pharmaceutical-nutrition studies.

Keywords: Ethnomedical, medicinal plants, Kelantanese aborigines.

Introduction

The World Health Organization (WHO) had reported that 80% of populations in some Asian and African countries still depend on traditional medicine for primary health care (Lai *et al.*, 2010; Samuel *et al.*, 2010). Traditionally, local communities worldwide are very knowledgeable about local plants and other natural resources (Martin, 1995). The traditional herbal knowledge is passed from generation to generation in verbal form by traditional medicine man or 'bomoh' (Lin, 2005). Unfortunately, much of this wealth of

knowledge is diminishing as traditional cultures have eroded and the younger generation is no more attracted to this folk medicine (Martin, 1995; Lin, 2005). Hence, ethnobotanical studies gain important to preserve the wealth of knowledge about folk medicine.

In Malaysia, documentation on traditional medicinal plants is still ongoing. The ethnobotanical studies on few regions in Malaysia have been reported (Kulip, 2003; Lin, 2005; Samuel *et al*., 2010; Al-Adhroey *et al*., 2010; Ong *et al.*, 2011a; Ong *et al*., 2012). Medicinal plants used in Malay villages in different states of Malaysia have also been published (Ong & Nordiana, 1999a, b; Ong *et al.*, 2011b; Ong *et al.*, 2011c). Hence, this study was carried out to investigate and document the traditional use of medicinal plants, which are common among the aborigines in Gua Musang, Kelantan.

Materials and Methods

Study area

The study were carried out in three aborigine Resettlement Plan Scheme (RPS) in Gua Musang (4°52'N, 101°58'E), a district of Kelantan state (**Figure 1**): Kuala Betis, Kg. Mendrop and Pos Simpor. Gua Musang is the biggest among the ten districts located in the south of Kelantan and with an area of 797 977 hectares. The aborigines involved in this study are from the Temiar sub-ethic group.

Data collection

Data were collected by interviewing the aboriginal households (house-to-house interviews) and traditional healers. The interview process was based on methods described by Martin (1995). Interviews were conducted in a local Malay dialect and 70 informants were involved in the interviews. The sample size was determined using Epi Info™7 Software.

Figure 1: Location of study area in Gua Musang, Kelantan, Malaysia

Information on plant preparation, application and the parts used for medicinal purposes were obtained from each respondent using a questionnaire. Specimens that were easily identified in the field were noted but not collected. Unidentifiable specimens were numbered and brought to the Herbarium of Universiti Sains Malaysia, Pulau Pinang, Malaysia to be further examined further. Prior to the study, an ethical approval was obtained from the Human Ethical Committee of Universiti Sains Malaysia and the Department of Orang Asli Development (JAKOA), Ministry of Rural and Regional Development.

Data analysis

The information obtained from the interviews was analyzed using the following parameters (Camejo-Rodrigues *et al.*, 2003; Al-Adhroey *et al.*, 2010):

1. Taxonomic diversity, preparation, application and parts of the plant used.
2. The knowledge of medicinal plants between female and male; and between two age categories: 18-39 and ≥40 years of age.
3. The percentage of respondents who have knowledge regarding the medicinal plants estimated using the formula: (number of people interviewed citing species/total number of interviewed people) × 100.
4. The frequencies of citations so as to identify the most common ailments in the study area and popularly used medicinal plant species.

Results and Discussion

Knowledge of medicinal plants

Table 1 shows that female respondents reported more medicinal plants than the male respondents. The number of medicinal plants reported by the respondents for the 40 years old age group was more than the 18-39 years age group. Geographical origin, residence, ethnicity, religion, age and gender are the factors that can influence the variation in ethnobotanical knowledge and practice within any culture (Pfeiffer and Butz, 2005).

Table 1: The number of medicinal plants reported by female and male informants in Gua Musang

Medicinal plants reported	Female (age category in years)			Male (age category in years)		
	18-39	**≥40**	**Total**	**18-39**	**≥40**	**Total**
0	15	10	25	9	7	16
1	3	3	6	1	2	3
2	1	5	6	0	1	1
3	1	2	3	0	2	2
4	1	0	1	0	0	0
5	0	0	0	0	1	1
6+	0	0	0	0	6	6
Total	21	20	41	10	19	29

Analysis of the relationship between gender and knowledge showed that there was no significant difference between information given by female and male respondents (n= 70). The source of knowledge about medicinal plants is the main factor for the difference in knowledge between the respective respondents. Female aborigines learn the knowledge from their mothers or fathers by routine observation while the male aborigines were taught by their fathers. However, nowadays many aboriginal male especially the young generations choose to work outside their village such as town and city. Therefore, they do not have enough time to learn knowledge about medicinal plants. Because of that, the male are less knowledgeable about the medicinal plants compare to the female.

Analysis of the results on age versus knowledge relationship revealed that there was a wide gap between generations. More information was obtained from the elderly informants than the young ones. The knowledge of medicinal plants among the native is fading due to dependence on modern medicine and a loss of interest among the young. Besides this, the deforestation for agriculture, development and timber harvesting have also made the resource scare. This interrupts the transfer of knowledge from elders to the new generations.

Medicinal plants reported by the informants

This study recorded a total of 46 plant species that are being used by aborigines in Gua Musang, Kelantan. These medicinal plants belong to 37 families. **Table 2** shows the list of medicinal plants collected during the survey with information on the scientific or botanical name, family name, aboriginal name and Malay name, parts of the plants used, method of preparation and the medicinal uses.

Most of these species grow in the wild but some of them can be found in nearby upland agricultural fields and also recultivated near the houses (*ladang*). Most of the respondents use the plants to treat same disease but with only slight variation in recipes. Most of the species were easily recognized by the informants with their respective local Malay dialect. The species only known in local aboriginal dialect were collected for herbarium and identification.

Further analysis on the herbal families showed that Zingiberaceae family is represented by the highest number of species (4 species), followed by Euphorbiaceae (3 families). The rest are represented by two species each (5 families) and one species each (30 families).

Analysis of the habit of the medicinal plants used in treatment elucidated that 16 species are trees, 15 herbs, 7 shrubs, 6 climbers, 1 liana and 1 lichenous (**Figure 2**).

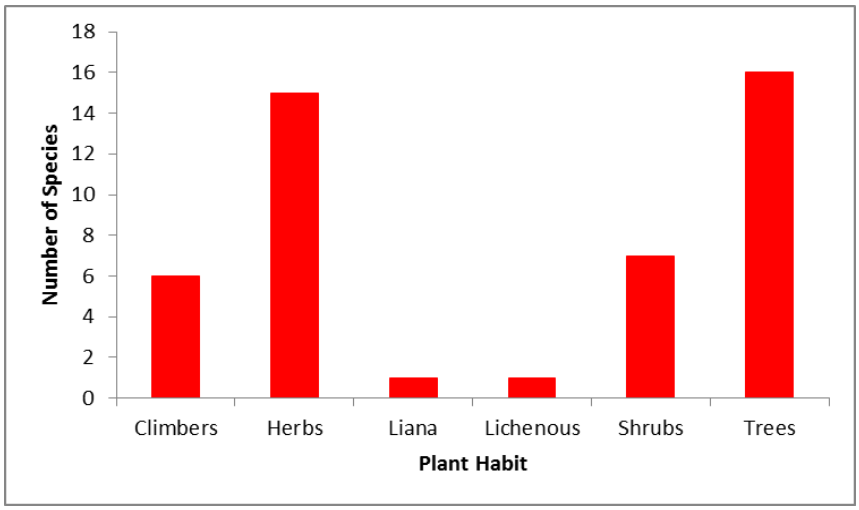

Figure 2: Habit of medicinal plants used to treat human ailments

Table 2: Plants used by Aborigines in Gua Musang, Kelantan

No.	Botanical family	Botanical name	Local aboriginal dialect	Local Malay dialect	Part used	Method of use	Medicinal uses	PRK
1.	Araceae	*Homalomena sagittifolia*	Daun kemoyang	Kemoyang, keladi kemoyang	Leaves	Heated and wrapped on stomach	Postpartum treatment	2.9
2.	Araucariaceae	*Agathis borneensis*	Raja kayu	Damar minyak	Trunk	Scraped, boiled and drink	Gastric, body pain, energy, relieve aching and muscular pain	4.3
3.	Balsaminaceae	*Impatiens balsamina*	Daun inai	Keembung	Leaves	Boiled and as a bath	Jaundice	4.3
4.	Bignoniaceae	*Oroxylum indicum*	Pokok beka	Pokok beka	Bark	Boiled and drink	Malaria, hypertension	1.4
5.	Bombacaceae	*Ceiba pentandra*	Kekabu	Kekabu	Shoot	Boiled and drink	Fever, coughing	1.4
6.	Compositae	*Blumea balsamifera*	Tutum	Subong, capa, telinga kerbau	Leaves	Boiled and drink or soaked in hot water and drink	Hypertension	1,4

7.	Connaraceae	*Rourea rugosa*	NA	Perijeh, sembilat putih	Leaves	Boiled and drink	Toothaches	1.4
8.	Convolvulaceae	*Ipomoea batatas*	Keledek	Keledek, ubi jalar, ubi jawa, ubi ketela, ubi setela, ubi rambat	Tuber	Boiled and eat the tuber	Hypertension	1.4
9.	Chlorantahaceae	*Chloranthus erectus*	Rengek	Gadis lompat	Leaves	Boiled and used as a bath	Scabies	1.4
10.	Cluseaceae or Guttiferae	*Garcinia rostrata*	Buah lapa	Lulai, kandis	Fruit	Eat the fruit	Hypertension	1.4
11.	Euphorbiaceae	*Antidesma coriaceum*	NA	Berunai	Leaves	Boiled and rubbed to body	To make the child walk.	1.4
12.	Euphorbiaceae	*Manihot Esculenta Crantz*	Ubi kayu	Ubi kayu	Leaves	Heated and wrapped on stomach	Stomach ache	1.4
13.	Euphorbiaceae	*Phyllanthus niruri*	Samei	Dukung anak	Whole plant	Boiled and as a bath	Jaundice	4.3
14.	Gentianaceae	*Fagraea acuminatissima*	Tengkuk biawak	Tengkuk biawak	Roots	Boiled and drink	Hypertension	4.3

15.	Guttiferae	*Garcinia opaca var.dumosa*	Belugur	Kandis	Leaves	Boiled and drink	Hypertension	4.3
16.	Lauraceae	*Cinnamomum microphyllum*	Rempah gunung, keroek	Medang	bark, fruits and roots	Boiled and drink	Relieve excessive wind in the body	5.7
17.	Lauraceae	*Lindera lucida*	Greb	Medang paya, serapu putih	Leaves	Boiled and as a bath	Jaundice	1.4
18.	Leguminosae	*Albizia myriophylla*	Tebu gajah	Tebu gajah, akar manis	Roots	Boiled and drink	Hypertension, diabetes	1.4
19.	Malvaceae	*Hibiscus rosasinensis*	Bunga raya	Bunga raya, bunga sepatu	Shoot	Soaked in warm water	Fever, coughing	1.4
20.	Malvaceae	*Sida rhombiflora*	NA	Lidah ular	Whole plant	Boiled and as a bath	Jaundice	1.4
21.	Melastomataceae	*Melastoma malabathricum*	Keruduk (ungu)	Senduduk (ungu)	Roots and fruits	Root is boiled and drink, raw fruit is eaten	Ringworm	1.4
22.	Melastomataceae	*Phyllagathis rotundifolia* (Jack) Blume	NA	Tapak Sulaiman	Leaves	Rubbed the itchy places	Poison worm	2.9

23.	Meliaceae	*Lansium domesticum Jack*	Langsat	Langsat	Bark, roots	For scabies mixed with tongkat ali, boiled and as a bath. For diarrhea, boiled and drink	Scabies, diarrhea	4.3
24.	Menispermaceae	*Coscinium blumeanum*	NA	Akar sekunyit	Roots	Boiled and drink	Asthma, jaundice	1.4
25.	Mimosaceae	*Entada phaseoloides*	Akar beluru	Akar beluru	Roots	Crushed and rubbed on the head	Hair shampoo	2.9
26.	Musaceae	*Musa acuminate* Colla	Pisang hutan	Pisang hutan	Stem	Heated and tied on leg	Gout , sprain	1.4
27.	Myrsinaceae	*Labisia pumila*	Kacip Fatimah	Kacip fatimah	Roots	Boiled and drink	For women energizer, Muscle pain	15.7
28.	Myrtaceae	*Baeckea frutescens*	Rendang	Chucor atap	Leaves	Boiled and drink	Malaria	1.4
29.	Oxalidaceae	*Oxalis barrelieri*	Belimbing tanah	Belimbing tanah	Whole plant	Boiled and drink	Hypertension, diabetes	1.4

30.	Palmae	*Areca catechu*	Pinang	Pinang	Fruits	Boiled and eat the fruit	Hypertension	1.4
31.	Palmae	*Iguanura geonomiformis* mart.	Maro	Pinang pacat	Leaves	Boiled and drink	Cough	1.4
32.	Polygalaceae	*Polygala paniculata*	Brakol	Pokok minyak angina	Whole plant	Boiled and rubbed on body	Jaundice	1.4
33.	Polyporaceae	*Lignosus rhinocerus*	Kulat susu harimau	Kulat susu rimau, cendawan susu harimau	Tuber	Minced and boiled	Asthma, poisoning	5.7
34.	Rafflesiaceae	*Rafflesia hasselti*	Bunga pakma	Bunga pakma	Flower	Cut, dried, boiled and drink	Postpartum treatment	8.6
35.	Rubiaceae	*Uncaria cordata*	Kadukdak	Kait-kait	Sap in tree	Drink	Stomach ache, diarrhea	4.3
36.	Simaroubaceae	*Eurycoma longifolia*	Tongkat ali	Tongkat ali, pasak bumi	Roots and leaves	Boiled and drink	Fever, sexual stimulant for men, energy	15.7
37.	Smilacaceae	*Smilax Myosotiflora*	Ubi jaga	Ubi jaga	Tuber	Boiled and drink	Sexual stimulant for men, energy	2.9

38.	Smilacaceae	*Smilax regelii*	Pokok sarsi	Pokok sarsi, akar sarsi	Roots and bark	Boiled and drink	Relieve excessive wind in the body, body joint pain	2.9
39.	Scrophulariaceae	*Striga Asiatica*	Jarum emas	Jarum emas, Rempah padang	Whole plant	Boiled and drink	Sexual stimulant for men	4.3
40.	Taccaceae	*Tacca cristata Jack*	Belimbing tanah	Belimbing tanah, belimbing hutan	Leaves, roots	Boiled and drink	Hypertension, diabetes	1.4
41.	Thymelaeaceae	*Aquilaria malaccensis*	NA	Karas	Leaves	Boiled and drink	Asthma	1.4
42.	Umbelliferae	*Eryngium foetidum*	Serai berma	Ketumbar jawa	Leaves	Heat and put on stomach	Stomach ache	4.3
43.	Zingiberaceae	*Etlingera elatior*	Kantan	Kantan	Fruit and flower	To cool down the body, the fruit is pounded, put in water and as a bath For the	Cool down the body, hypertension	2.9

						hypertension, the flower is boiled and drink		
44.	Zingiberaceae	*Zingiber spectabile*	NA	Cadak/Tupoi	Sap in the flower	As a bath	Body aching	1.4
45.	Zingiberaceae	*Zingiber zerumbit*	Halia hutan	Halia hutan	Tuber, roots and stem	To stand the baby, boiled tuber with kacip Fatimah and tongkat ali and drink. For gout, pound the roots and stem, boiled and can be drink, bath or wrap	To stand the baby, Gout	5.7
46.	Zingiberaceae	*Etlingera littoralis*	Tepus	Tepus	Leaves	Took the pith, pound and tied on head	Fever, cool the body	1.4

NA = No common name in Aboriginal dialect; PRK = Percentage of respondents who have knowledge about the plant.

Plant parts used and mode of preparation

In this study, leaves were the most common part used, i.e. 36.96% of the total number of species (**Table 3**). This was followed by the roots (26.09%), whole plants and fruits with (10.87%), bark and tuber (8.70%), shoot, stem, sap and flower (4.35%) and trunk (2.17%). The practice of mainly using the leaves in herbal medicine was in concurrence with previous studies (Kulip, 2003; Ong *et al*., 2011b, c).

Table 3: Part of medicinal plants used to treat various diseases

Parts used	Number of species	Percentage
Leaf	17	36.96
Root	12	26.09
Whole plant	5	10.87
Fruit	5	10.87
Flower	2	4.35
Bark	4	8.70
Shoot	2	4.35
Stem	2	4.35
Sap	2	4.35
Trunk	1	2.17
Tuber	4	4.35

Different parts of a single plant may be concocted and used for a particular type of disease. For example, the bark, fruits and roots of *Cinnamomum microphyllum* are concocted to relieve excessive wind in the body, the roots and fruits of *Melastoma malabathricum* are used to treat ringworm, while the leaves and roots of *Tacca cristata* are concocted to treat hypertension and diabetic.

Mixing up of different plant species for treatment of the same disease is also commonly practiced among the aborigines. The bark and roots of *Lansium domesticum* are boiled with *Eurycoma*

longifolia and used as a bath to treat scabies; the tuber of Zingiber zerumbit is mixed with Labisia pumila and Eurycoma longifolia and made into decoction to give a time gap between pregnancies.

In most of the treatments, most medicinal plants were administered orally compared to topical application. They were used freshly or dry, chewed or boiled in water. The most common method preparation was decoction (76.09%), followed by poultice (15.22%), infusion (4.35%) and others (8.70%), **Figure 3**.

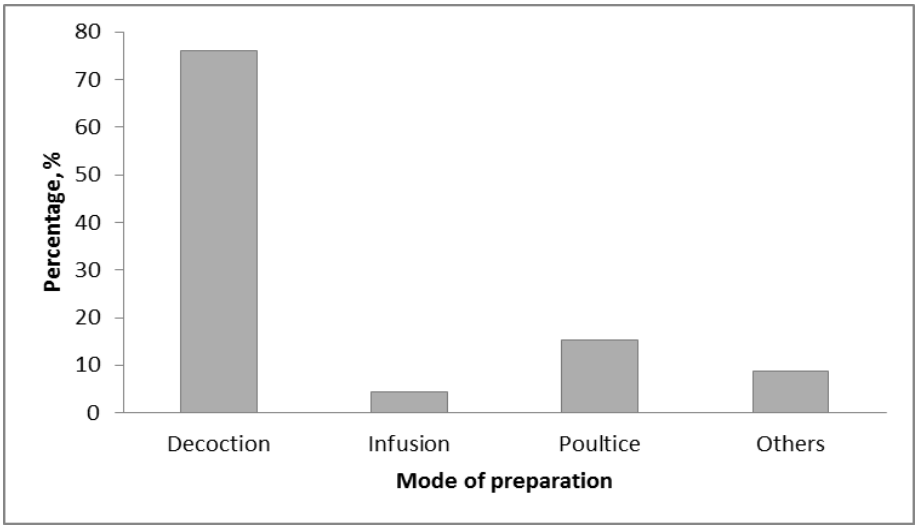

Figure 3: Percentage of mode of plant preparation

Medicinal plants and diseases

Our results showed that medicinal plants used by the aborigine were used to treat many types of medical problems, ranging from simple problems such as muscle pain and fever to chronic diseases such as diabetes and malaria. From the data collected, most of these plants were used to treat hypertension (26.67%), jaundice (13.33%) and diabetes (11.11%). Azliza *et al.* (2012) also revealed that hypertension is the most frequently treated ailment.

In terms of popularity, six of medicinal plant species can be put in the leading position. Among the medicinal plants reported, *Labisia pumila* and *Eurycoma longifolia* were found to be the most commonly used followed by *Rafflesia hasselti*, **Table 4**.

Table 4: Popularly used medicinal plants by aborigine in Gua Musang

Scientific name	**Frequency of report**
Labisia pumila	11
Eurycoma longifolia	11
Rafflesia hasselti	6
Cinnamomum microphyllum	4
Lignosus rhinoceros	4
Zingiber zerumbit	4

Analysis of data on medicinal use indicated that employment of a single species for a number of diseases is very common. For example, *Agathis borneensis* is used to treat five different kinds of human diseases while *Eurycoma longifolia* and *Smilax regelii* are used for three human diseases each. The rests are used to treat one disease (28 species) or two diseases (15 species).

From the interviews with aborigine medical practitioners, it was found that different diagnosis and treatment methods are practiced depending on the type of ailment. Medical practitioner commonly diagnose each health problem by visual inspection of the patient, such as by observing the changes in eye and skin color, tongue and throat regions, body temperature and status of sores. Patients were also interviewed for symptoms observed and the duration of the health problem. Upon confirmation by the medical practitioner on the type of disease, the remedy is prescribed. However, most of the preparation of medicinal plants is of unknown standard doses. Some preparations of medicinal plants were measured using a small cup or jug, while others use a spoon or not directly measure quantity used.

Conclusion

From this ethnomedical study, there are many medicinal plants still being used by the aborigines. Many plant species are indicated as potential resource for treating various diseases. Hence further research is required to identify and assess their ethnomedical claim. This study will preserve the ethnobotanical and ethnomedical knowledge of the medicinal plants, expands the genetic resources obtainable in the area of research and signifies a potential source of natural products for treating various diseases.

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