Ethnobotanical study of medicinal plants among four Chin indigenous groups in Tedim Township, Northern Chin State, Myanmar

Thet Thet Mar Win¹

Abstract

The Traditional medicinal plants are used by four Chin indigenous groups in inhabiting areas at Tedim Township, Northern Chin State, Myanmar. A total of 55 Se Yim, Ma Tu Pi, Tedim, Zombie, informants from 10 villages were interviewed using semi-structured questionnaires. Plant importance was determined using quantitative ethnobotanical indices such as Use Value (UV) and Informant Consensus Factor (ICF). A total of 34 wild medicinal plant taxa in 21 families across 11 disease/use categories; Skin disorders, Respiratory system, Digestive system, Genitourinary system disorder, Eyes and ear disorders, Cancer and tumors, Injuries caused by external factors, Skin care, Tonic and health drinks, Disease of the circulatory system and others were recorded. Species which were recorded as the highest number of Use-Reports (UR) appeared to play an important role not only in informants' primary healthcare and species conservation, but also in local livelihood. This study presents for the development of the country's herbal medicine industry. It can serve to show the Chin people as owners of their traditional medicinal knowledge, which is equally valuable to their future generations and for benefits sharing that may arise from their contribution.

Keywords: Ethnobotany, Indigenous people, Northern Chin State.

Introduction

Traditional medicinal plant knowledge is an integral and very important part of indigenous cultures worldwide. The use of medicinal plants in folk and traditional medicine is widely practiced in healthcare systems in many poor and developing countries (Asase and Kadera, 2014; Giday et al., 2016; Kpodar et al., 2015). Local communities throughout Myanmar have extensively relied on plants for medicinal and health purposes. Due to its varying climatic conditions and geographic features and history of political and economic isolation (WBG, 2014), Myanmar still remains endowed with vast natural resources. Documenting Myanmar's traditional medicinal knowledge is not only important in the search for potential plant species for drug discovery and for the development of herbal medicine research but is also integral to its people's cultural identity. The quantitative ethnobotanical study conducted in the country, aimed to document the wild medicinal plants and their uses in traditional herbal therapies among the Chin ethnic group in northern Chin State. In cooperation with the local indigenous groups, this study was carried out to document the uses of wild medicinal plants among four ethnic groups in Northern Chin State.

The objective of this research was to identify wild medicinal species and evaluate their local importance in local people's healthcare as well as in protected area conservation; and to compare traditional medicinal plant knowledge among the informants.

¹ Associate Professor, Botany Department, Maubin University

Materials and Methods

Study area

The study was conducted in Myanmar's mountainous northern border region of Chin State, in particular its remote and northern town of Tedim or Tiddim. The majority however, is made up of four indigenous groups speaking local languages. They are unique as such that each one has distinct customs and traditions. Only narrow roads and seasonally-passable village tracts connect most of these villages, which have an average elevation of 2,703 meter peak. Houses in the area are generally constructed on stilts in order to adapt to the steep and rugged terrain of the Chin Hills (Ong et al., 2017: Ong et al 2018).



Figure 1 Map of Tedim Township, showing the research site (villages)

Informants interview

Interviews conducted to members of four Chin indigenous groups, the Se yim, Ma tu pi, Tedim, Zombie, were selected for this study. They are the dominant hill-tribe communities spread in relatively small villages such as Tai ngen, Bekan, Hiang zing, Tae zan, Mulapi, Khai kam, Ak luai, So zang, Sua hlim, Kennedy Peak. During the survey time, we conducted a 10 days small group and face-to-face interviews to a total of 55 informants. Permission to conduct a survey in each village and prior informed consent was obtained from village leaders. The majority of the informants were Se yim (22) and Tedim (20). Most of the participants are male (56 %). Table 1 represents a more detailed demographic data of the informants.

Informants	No (%)
Gender	31(56)
Male	31(56)
Female	24(43)
Age	
17	2 (4)
20-29	5 (9)
30-39	8 (14)
40-49	11(20)
50-59	14(25)
60 above	15(27)
Chin group	
Se yim	22(40)
Tedim	20(36)
Ma tu pi	8 (14)
Zombie	5 (9)

Table 1 Demographic data of the informants

Ethnobotanical data were gathered using a semi-structured interview questionnaire. Interviews were carried out in the local language by the second author, U On (who is a Se yin Chin tribe) and were subsequently translated from Chin to Myanmar. Standard questions focused on informants' direct experience(s) in the use of wild medicinal plants and the diseases they treat. Modes of plant preparation, part(s) used, place(s) of collection, distribution and availability, and season(s) of collection were also recorded to obtain a clearer perspective on the diversity of plants and their uses.

Collection of plant specimens

Most plant specimens were collected together with key informants and were scientifically determined by referring to several botanical references. Taxonomic circumscription of plant families and species followed by the APG IV system (Chase et al., 2016) and the information found on The Plant List (2013) in order to ensure uniform nomenclature. Voucher specimens were deposited at Herbarium in the University of Yangon. Data analysis focused only on wild medicinal plants and their preparation in treating clinically diagnosed illnesses grouped under 11 categories according to diseases of the human body systems and the ICD-10 (International Classification of Diseases) of the World Health Organization (WHO, 2011).

Quantitative data analyses

Quantitative ethnobotanical methods were employed by determining the use(s) of each plant as reported by the informants. In this project paper, quantitative data analyses are based on;

Use-report (UR)

A single use-report (UR) for a plant was recorded every time an informant cited it for a particular purpose under a disease/use category. Use Value (UV)

UV is calculated using the following formula: $UV = (\Sigma Ui)/N$, where Ui is the number of UR cited by each informant for a given species, and N is the total number of informants.

Informant Consensus Factor (ICF)

ICF is computed using the following formula:

ICF = (Nur-Nt)/(Nur-1), where Nur is the number of UR in a category, and Nt is the number of plant taxa recorded in the same category.

Results

Diversity of plants and uses

After taxonomic identification of reported ethnomedicinal plants, there were able to document 34 wild medicinal plants taxa in 21 families across 11 disease /uses categories. Among the 21 families recorded, the Zingiberaceae (Ginger Family), Rosaceae (Rose Family), Polygonaceae (Buckwheat Family), Euphorbiaceae (Spurge Family) and Asteraceae (Sunflower family) were found to be highly represented with 3 species and were followed by Ericaceae (Heath or Heather Family), Fabaceae (Bean family), Lamiaceae (Mint Family) and Solanaceae with 2 species respectively.



Figure 2 Most represented plant families

In terms of plant use, the leaves were reported as the most commonly utilized (42%), followed by fruits (19%), rhizomes (16%), shoots (7%), whole plants (5%), roots (5%), buds (2%), seeds (2%) and flowers (2%).



Figure 3 Plant parts use percentage in herbal preparations.

Noteworthy plants and their use values (UV)

Among the 34 ethnomedicinal plant taxa, those which showed the highest informant consensus (and therefore were most useful) are presented below. As the record, *Bergenia pacumbis* has the highest UR (50) and UV (0.9). The uses of this plant as remedies for many reported cases are stomachache, liver problems, menstrual bleeding, wound bleeding and even cancer. Most of the local people use this plant as a daily tonic. This is done by making the rhizome as a powder and mix with honey, then keep in bottle.

The second most cited plant in the survey was *Millettia extensa*. The second highest UR (26) and UV (0.5) among 35 taxa. All of the informants agreed on the use of this plant as the treatment for fracture. As the Chin state is difficult in transportation, most of the indigenous people use this plant when they break their hands or legs by tying those leaves and stems together with rope around the broken areas.

Centella asiatica was another notable medicinal species as it recorded the third highest UR (25) and UV (0.5). Decoction of its leaves was highly cited for treating blurry vision and urinary problems.

Hedychium spicatum was the fourth highest UR (24) and UV (0.4). This plant is also used for many kinds of diseases such as menstrual bleeding, wound bleeding, tonic, asthma, and kidney problems.

Disease/use categories and their informant consensus factors (ICF)

In this study, data of medicinal plant use were grouped into 11 diseases/use categories mostly based on the International Classification of Diseases (ICD-10) by the WHO (World Health Organization). The categories are (1) Skin disorders, (2) Respiratory system, (3) Digestive system, (4) Genitourinary system disorders, (5) Eyes and ears disorders, (6) Cancer and tumors, (7) Injuries caused by external factors, (8) Skin care, (9) Tonic and health drinks, (10) Disease of the circulatory system and (11) Others.

Out of the 11 diseases/use categories, Category 1(Skin disorders), 5 (Eyes and ears disorders) and 7 (Injuries caused by external factors) showed the highest ICF (1.00) after computation of its recorded Nur. The worthy plant species of these categories are *Euphorbia tithymaloides*, *Centella asiatica*, *Bergenia pacumbis* respectively. Category 3(Digestive system), 8 (Skin care), 9 (Tonic and health drinks) and 10 (Disease of the circulatory system) showed the second highest ICF (0.9) after computation of its recorded Nur. The worthy plant species of these categories are *Millettia extensa*, *Rhododendron cuffeanum* and *Bergenia pacumbis*.

Medicinal plant knowledge

When grouped according to location, descriptive and inferential statistics revealed that the informants from the SeYim tribe showed higher medicinal plant knowledge than the informants from the others. When grouped according to level of education descriptive and inferential statistics revealed that the informants with lower education showed higher medicinal plant knowledge than the ones with higher education. When grouped according to gender descriptive and inferential statistics revealed that the men showed higher medicinal plant knowledge than the women. When grouped according to age descriptive and inferential statistics revealed that the informants from the age group of 60 years old and above showed the highest medicinal plant knowledge compared to the informants from the age groups of 30-50 years old.

No.	Scientific name	Family	Local name	Part(s) used	Uses
1	Acacia pennata (L.) Willd.	Fabaceae	Subok (Chin tho pwe)	Leaves	The leaves are stomachic, styptic for Bleeding gum, and antiseptic for scalding of urine
2	<i>Arisaema wattii</i> Hook. f.	Araceae	Wa-U	Tuber	The dried powdered tuber is applied to
3	Anneslea fragrans Wall	Pentaphylacacaeae	Pan ma	Bark and flowers	The bark and flowers are vermifuge and are also used in the treatment of dysentery and fevers.
4	Bergenia pacumbis (BuchHam. ex D.Don) C.Y.Wu & J.T.Pan	Saxifragaceae	Nat Say Gamone	Rhizome	The rhizome as a powder mix with honey and keep in bottle, then place in sun dry is used as a daily tonic. It is also used in the treatment of stomachache, wound bleeding and menstrual bleeding.
5	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Myin-hkwa	Leaves, whole plant	Decoction of its leaves was highly cited for treating lungs disease, dysentery, oliguria, blood in urine, antidote for poison, cold and cough.
6	Cinnamomum verum Presl	Lauraceae	Thitkyabo	Bark	Used for local remedies, particularly for gastrointestinal and respiratory disorders and as an aphrodisiac.
7	Chromolaena odorata (L.) R.M. King & H. Robinson	Asteraceae	Bizat	Leaves	The young leaves are crushed, and the resulting liquid can be used to treat skin wounds. The leaves are used to treat eye pains.
8	<i>Coleus aromaticus</i> Benth.	Lamiaceae	Zeeyar	Leaves	Remedy for fever, cough, and common cold in children.
9	Curcuma longa L.	Zingiberaceae	Nanwin	Rhizome	Commonly used for conditions involving pain and inflammation, such as osteoarthritis. It is also used for hay fever, depression, high cholesterol, a type of liver disease, and itching.
10	Eriolobus indica Schneid.	Rosaceae	Makhawk	Fruit	'Makhawk' wine making from fruit is

Table 2 Ethnomedicinal plants used by four Chin indigenous groups

11	Euphorbia tithymaloides L.	Euphorbiaceae	Gon ga man	Leaves	famous in local and good for kidneys Leaves used to treat abscess.
12	<i>Euphorbia milii</i> Moutins.	Euphorbiaceae	kiss me quick/Shazaung-	Leaves	Used for dysentery.
13	<i>Fagopyrum dibotrys</i> (D. Don) H. Hara	Polygonaceae	tinga-nean Wild buckwheat	Rhizome, Stem	Rhizome best use for Insect bites. It is used in the treatment of eczema and liver disorders. The stem also used as fodder.
14	<i>Hedychium spicatum</i> Sm.	Zingiberaceae	Thangasin gamon	Rhizome	used for many kinds of diseases such as menstrual bleeding, wound bleeding, tonic, asthma, and kidney problems.
15	Hibiscus hispidissimus Griff.	Asteraceae	Taw Chin paung	Leaves	The juice of leaves mixed with honey is used in the treatment of eye diseases.
16	<i>Kaempferia parviflora</i> Wall.	Zingiberaceae	Gamon-ni	Tuber	Tubers have astringent properties and are used in the treatment of coughs, dysentery and diarrhoea.
17	Mentha arvensis L.	Lamiaceae	Pusi-nan	Leaves	Leaves - raw or cooked. A herb tea is made from the fresh or dried leaves.
18	<i>Millettia</i> <i>extensa</i> (Benth.) Benth. ex Baker	Fabaceae	Win u	Leaves, stem	Most of the indigenous people use this plant when they break their hands or legs by tying those leaves and stems together with rope around the broken areas.
19	Momordica charantia L.	Cucurbitaceae	Taw kyat hinga	Fruit, whole plant	Used for diabetes, dysentery, fever, hypertension, malaria, rheumatism, worms.
20	<i>Musa itinerans</i> E.E. Cheesm.	Musaceae	Taw-nget-pyaw	Leaves, Root, Stem	A poultice of the leaves is used to treat burns and other skin ailments. A poultice of the roots has been used to treat carbuncles, swellings, digestive disorders and dysentery. An infusion of the stem pulp is used to treat dysentery as well as fodder.
21	Ocimum sanctum L.	Solanaceae	Pin sein net	Leaves	Leaves are helpful in relief from cold, cough and very effective expectorant.
22	Oroxylum indicum	Bignoniaceae	Kyaung-sha	Leaves,	A decoction of the

	(L.) Kurz			Bark	bark is refrigerant, used in the treatment of fevers and jaundice. A decoction of the leaves is drunk as a treatment for
23	Phyllanthus emblica L.	Phyllanthaceae	Zee phyu	Fruit	The juice of the fruit is also given in order to strengthen the pancreas of diabetics, as well as in the treatment of eye problems, joint pain, diarrhoea and dysentery
24	Plantago major L.	Plantaginaceae	Ah gyaw paung ta htaung	Leaves	Young leaves - raw or cooked. The dried leaves make an acceptable tea. Commonly used traditional medicine, including wound healing, anti- inflammatory, anti- oxidant, antibiotic and diuretic.
25	Polygonum chinense var. hispida Blume	Polygonaceae	Maha-gar-kyan- sit	Whole plant	A decoction of the plant is used as a depurative. Externally, the decoction is used to treat eczema of the ears. The juice of the plant is employed in the treatment of eye diseases. A poultice is applied to the abdomen as a treatment for stomach-ache
26	Paris polyphylla Sm.	Melanthiaceae	Taung Tha Lone	Root	A decoction of the roots is used in the treatment of poisonous snake bites, boils and ulcers. A paste of the roots is used as a poultice to treat cuts and wounds. The juice of the roots also used as an anthelmintic.
27	Passiflora edulis Sims	Passifloraceae	Pin-hme	Fruit	Fruit - raw or cooked. The pulp of the fruit is stimulant and tonic.
28	Polygonum paleaceum Wall.	Polygonaceae	Khwe Shar	Whole plant	Plant juice used to treat urinary tract
29	<i>Prunus cerasoides</i> D. Don	Rosaceae	Cherry	Fruit, Bark	The fruit is astringent. The juice of the bark is applied externally to treat backaches
30	Rhododendron	Ericaceae	Taung Zalat	Root	The plants are used

	<i>cuffeanum</i> Craib ex Hutch.		Phyu		as ornamental, and roots are ground and applied to treat acne,
31	<i>Rhododendron</i> <i>arboreum</i> W.W. Sm.	Ericaceae	Taung Zalat ni	Flower	scar and would. Traditional preparations - Taung- zalat-ni wine making from 100 flowers, sugar, 1 tea spoon wine yeast, and 3 gallon water. The dried flower used to treat dysentery and diarrhea.
32	<i>Roscoea alpina</i> Royle	Zingiberaceae	Lily	Root	Root powder mixed with sugar and taken with milk is regarded useful as tonic, leucorrhoea, diarrhea and dysentery. It is also useful veterinary medicine.
33	Solanum betaceum Cav.	Solanaceae	Sin-hkayan-gyin	Leaves, Fruit	Fruit - raw or cooked. The leaves are warmed then wrapped around the neck as a remedy for sore throat. The fruit pulp, after having been cooked in embers, is used as a poultice for inflamed tonsils.
34	<i>Stemona burkillii</i> Prain	Stemonaceae	Thamya	Tuberous root	The dried powder of tuberous roots mixed with honey and used to treat cancer, lung and skin diseases.



Bergenia pacumbis

Centella asiatica

Millettia extensa



Rhododendron cuffeanum

Rhododendron arboreum

Euphorbia tithymaloides



Paris polyphylla

Hedychium spicatum

Stemona burkillii

Figure 4 Ethnomedicinal plants used by four Chin indigenous groups

Discussion and conclusion

In this study, Bergenia *pacumbis* can be regarded as the most cited plant in the survey, recorded the highest UR and UV. In Nepal, a juice or powder of the whole plant of *Bergenia pacumbis* is used to treat urinary troubles. The juice of

the leaves is used as drops to relieve earaches. The root is used as a tonic in the treatment of fevers, diarrhoea and pulmonary affections. The root is used to treat coughs and colds, haemorrhoids, asthma and urinary problems. (<u>http://www.naturalmedicinalherbs.net</u>). In Myanmar, the powder mixed with honey and keep in bottle, then place in sun dry is used as a daily tonic. It is also used in the treatment of stomachache, wound bleeding and menstrual bleeding.

Another remarkable species recorded was *Millettia extensa* in Myanmar. The extract of this plant is used in cosmetic formulations such as breast cream, eye gel, skin moisturizer, hair tonic and hair growth products. It is also used in treatment for fracture (Myanmar Medicinal Plant Database ,2013). The indigenous people use this plant when they break their hands or legs by tying with those leaves and stems together with rope around the broken areas.

Centella asiatica, is recorded as the third highest UR and UV. In India, Australia and Asia, *Centella asiatica* is used for cognitive function and brain health. It is also used for antioxidant and anti-inflammatory. Ayurvedic healers have traditionally used *Centella asiatica* to lower blood sugar. *Centella asiatica* directly increased insulin (http://www.naturalmedicinalherbs.net). In Myanmar, *Centella asiatica* is used to treat eye problems, urinary problems, tonic, sleep disorders, hypertension, cough, asthma and is used to promote hair growth and darkening.

Hedychium spicatum, the notable plant species, is recorded as the fourth highest UR and UV. In Western, *Hedychium spicatum* is used to treat liver complaints, fevers, vomiting, diarrhoea, inflammation, pains and snake bite. The root is used in Tibetan medicine, it is said to have an acrid taste and heating potency (<u>http://www.naturalmedicinalherbs.net</u>). In India, the rhizome is used as a stomachic, carminative, tonic and stimulant. (Chopra et al., 1956; Nadkarni, 1954).

When the use of plant parts was analyzed, the leaves were found to be the most preferred, followed by fruit and underground parts such as rhizome and root. The tendency to apply leaves and root was also observed among the hill-tribe peoples of Thailand (Inta etal., 2008; Tangjitman et al., 2013).

In Myanmar, it is used to treat inflammation, asthma, cough, vomiting, loss of appetite, bad smell, epilepsy and also used in snake bite (Ashin Nargathein, 1976). According to the survey, the study areas have plenty of medicinal plants which are both economical and beneficial products for Chin tribe people. It is a part of their social life and culture. Interviewees, traditional healers, practitioners and older people living in the surveyed villages, have well-knowledge of medicinal plants. Most of the people in studied parts of Tedim township, entirely depends on curing for cold, cough, fever, headache, poison bites, skin diseases and tooth infections using medicinal plants. Well-knowledge practitioners have good interactions with patients and improve the quality of healthcare delivery.

At present, medicinal plants are valuable and become at risk. Some plant species are extremely rare. Before they disappear, younger generations should list and note carefully. Important medicinal plants should be preserved, documented and harvested. Awareness creation should be made among the practitioners to avoid erosion of indigenous knowledge to ensure its sustainable use and conservation. Indigenous knowledge was transferred orally from generations to generations in this area and some practitioners were not transferring their knowledge. The study of Tedim township reflected inhabitants remotely rural and mountainous communities rely on knowledge of medicinal plants for their primary healthcare needs, as they adapt to environmental conditions. Their knowledge is valuable to the identity of future generations and benefits arise from their contribution.

Therefore, in future researcher or government institutions should work together with indigenous groups. They should conduct more ethnobotanical inventories significant for research work in Myanmar herbal medicine and pharmacology.

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