

Inventorization of indigenous medicinal plants and practices in Mizoram, North East India

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[Received 03.10.2017; Revised 08.11.2017; Accepted 21.11.2017; Published 31.12.2017]

Abstract

The present study was conducted during May 2015 to June 2016 and was proposed to document the indigenous ethno-medicines, knowledge on traditional medicines and its practices among the different Mizo tribes of Mizoram, North East India. In the Mizo health care system it is observed that instead of single drug preparation the local people usually prefer 2 or more combined form of herbal formulations. A total of 82 plant species belonging to 50 families, 76 genera which are used in 45 formulations are documented for the treatment of different diseases like malaria, jaundice, colon ulcer, asthma, typhoid, epilepsy, tuberculosis, cardiovascular and urinary problems etc.

Key words: Ethno-medicine, Formulations, Health care system, Epilepsy, Mizo

INTRODUCTION

Mizoram is one of the eight states of Northeast India, the name is derived from *Mi* (people), *Zo* (hill) and *Ram* (land), and thus Mizoram implies “land of the hill people”. It extends from 21°58' N to 24°35' N, and 92°15' E to 93°29' E with the tropic of cancer runs nearly through the middle of the state. It has a mild climate with average annual rainfall of 254 cm (Anonymous 2011). The vegetation of Mizoram is tropical evergreen and semi-evergreen forests in the low-altitude hills; sub-tropical to montane sub-tropical in the high hills (FSI 2011).

It is observed that over 99% of the interior rural population relies on herbal medicines and almost all the raw drugs are harvested from the wild plant resources (Lalramnghinglova 1998). In the remote areas due to high costs of drugs, lack of modern facilities and poor transportation, the patients are usually suffering for a long period of time. In Mizoram the number of doctors and other medical staff is very low in comparison to the total population (ratio doctors to total population was 1: 3,415). Thus, the people of the rural areas cannot take advantage of modern treatment methods and, instead, they rely on remedies from nature (Rai & Lalramnghinglova 2010). Under these conditions the herbal healers or the local healers play key role by providing them alternative medicines for their primary health care.

However, the traditional knowledge and practices are fast eroding due to change in lifestyles (modernization) and disappearances of forests (shifting cultivation). Therefore, there is an urgent need to inventorize and document all ethnobotanical information before the traditional cultures are completely lost. Keeping in view the above investigation has been carried out to explore and document such invaluable traditional practices in the local health system.

Study Area

The study was conducted at 31 villages and towns in 8 districts of the State. The study sites and their locations in their respective districts are indicated in Figure 1.

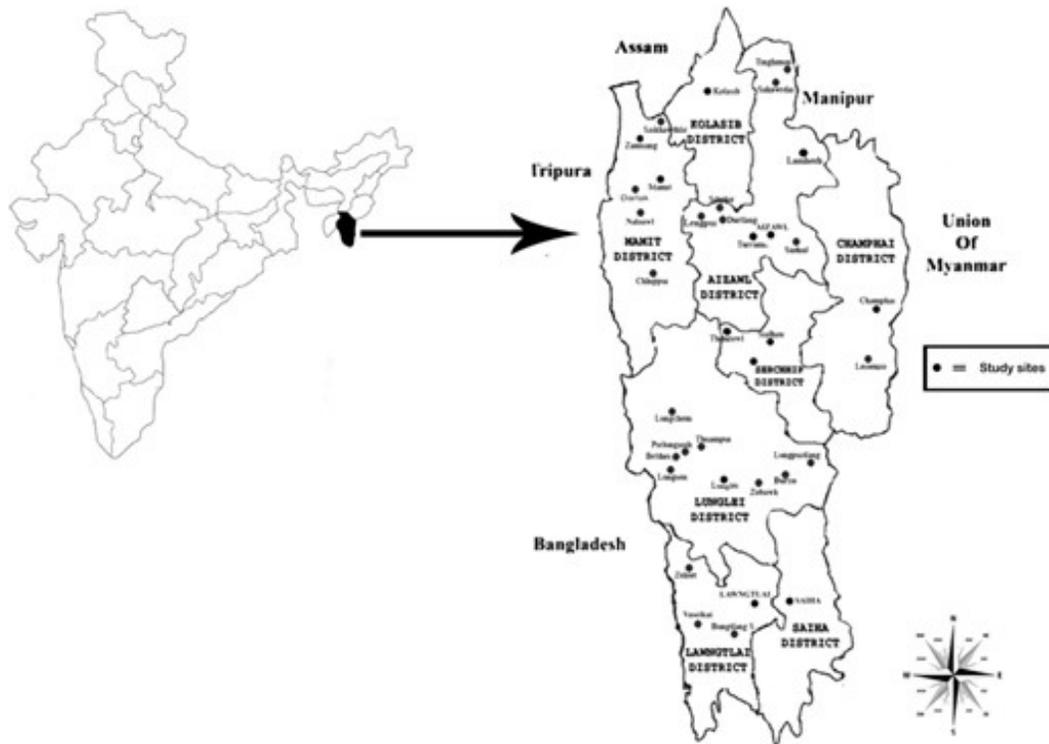


Figure 1. Location of the study sites.

MATERIALS AND METHODS

The knowledge on traditional medicines was collected through questionnaires, focus group discussions and semi structured interviews. Questionnaires were prepared with the help of Data Assessment for Local Health Traditions (DALHT) suggested by North Eastern Institute of Folk Medicines (NEIFM 2011) that include detailed information including plant local name, parts used, mode of preparation and application or dosages.

Conversations were done mostly through Mizo language. Interpreters were taken in case of Lai, Mara, Pang, Chakma, Bru, Hmar, Ralte and Pahlte languages. Prior Inform Consent was obtained from the respondents before documenting. The respondents were taken to the forests for collection of the voucher specimens, the guidelines suggested by Jain and Rao (1977) and Womersly (1981) were adopted in collection and preparation of herbarium.

Plant specimens were identified with the help of available regional floras and manuals (Hooker 1872 - 1897; Kanjilal *et al.* 1934-1940; Singh *et al.* 2002, 2012; Sawmliana 2013; Lalramnghinglova 2003). The unidentified specimens are taken ASSA Herbarium for identification by matching. An effort has been made to give the latest botanical names (The Plant List 2013) and the specimens are deposited in the Herbarium of Mizoram University, Aizawl.

RESULTS AND DISCUSSION

The collected data has been presented in Table 1, where botanical names are provided with family and references to voucher specimen and then followed by habit, disease, parts used, method of preparation/administration and dosage or mode of application.

Table 1. Enumeration of medicinal plants used in combinations by the Mizo community [Abbreviations used: T=Tree, S= Shrub, C= Climber, H=Herb]

Sl. No.	Scientific name [Family]; Collection No.	Local name	Habit	Disease	Parts used	Preparation, Administration & Storage	Dosage
1	<i>Anogeissus acuminata</i> (Roxb. ex DC.) Wall. ex Guillem. & Perr. [Combretaceae]; ZRC 22128	<i>Zairum</i>	T	Stomach ulcer	Bark	To 500 g each of barks and leaves, 3 liters of water is added and boiled for 2-3 hours. The filtrate is collected in a bottle	2 table spoon full (10 ml) thrice daily
	<i>Ficus hirta</i> Vahl [Moraceae]; ZRC 16663	<i>Theipui suak</i>	S		Leaves		
2	<i>Hedyotis scandens</i> Roxb. [Rubiaceae]; ZRC 16633	<i>Kelhnamtur</i> <i>Laikingtuibur</i>	C	Renal colic	Leaf stem	500 g each of the materials boiled in 2 liters of water for 30 minutes. The filtrate is collected in a plastic bottle for consumption	100 ml twice a day
	<i>Phyllanthus fraternus</i> G.L. Webster [Phyllanthaceae]; ZRC 16691	<i>Hlonuar</i>	H		Root		
	<i>Oroxylum indicum</i> (L.) Kurz [Bignoniaceae]; ZRC 22109	<i>Archangkawm</i>	T		Bark		
	<i>Callicarpa arborea</i> Roxb. [Lamiaceae]; ZRC 16692	<i>Hnahkiah</i>	T		Bark		
3	<i>Tinospora sinensis</i> (Lour.) Merr. [Menispermaceae]; ZRC 22123	<i>Vankai-hrui</i>	C	Malaria	Aerial roots	One long aerial root and 1 leaf are crushed and the juice is directly taken internally for malaria	5 ml of filtrate taken twice a day
	<i>Azadirachta indica</i> A.Juss. [Meliaceae]; ZRC 16649	<i>Nimpata</i>	T		Leaf stem		
4	<i>Dillenia pentagyna</i> Roxb. [Dilleniaceae]; ZRC 16634	<i>Kaihzawl</i>	T	Hypertension	Bark	500 g each of the materials boiled in water for about 2-3 hours. The filtrate is collected in a plastic bottle for consumption	100 ml twice a day before meals
	<i>Derris robusta</i> (DC.) Benth. [Leguminosae]; ZRC 16664	<i>Thingkha</i>	T		Leaves or bark		
	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht [Costaceae]; ZRC 16655	<i>Sumbul</i>	H		Leaves		
	<i>Blumea lanceolaria</i> (Roxb.) Druce [Asteraceae]; ZRC 22101	<i>Buarze</i>	S		Leaves		
	<i>Phyllanthus emblica</i> L. [Phyllanthaceae]; ZRC 16656	<i>Sunhlu</i>	T		Fruit		
5	<i>Calamus tenuis</i> Roxb. [Arecaceae]; ZRC 16665	<i>Thilte</i>	S	Malaria	Tender leaves	A handful of the tender leaves and the roots are grinded thoroughly and the juice is squeezed out which is given for malarial fever.	One teaspoonful (5 ml) thrice daily.
	<i>Tinospora sinensis</i> (Lour.) Merr. [Menispermaceae]; ZRC 22123	<i>Vankai-hrui</i>	C		Aerial roots		
6	<i>Callicarpa arborea</i> Roxb. [Lamiaceae]; ZRC 16692	<i>Hnahkiah</i>	T	Stomach problems	Leaves	To 2 kg of leaves and barks is boiled in 4-5 liters of water in a steel vessel for 2-3 hrs and the cooled filtrate is collected in a glass bottle and stored in cool place.	Taken 1 cup (100 ml) twice a day
	<i>Anogeissus acuminata</i> (Roxb. ex DC.) Wall. ex Guillem. & Perr. [Combretaceae]; ZRC 22128	<i>Zairum</i>	T		Bark		
7	<i>Callicarpa arborea</i> Roxb. [Lamiaceae]; ZRC 16692	<i>Hnahkiah</i>	T	Fever	Bark	500g of the bark and 20 leaves are boiled in water. The filtrate is mixed with 250 g of sugar for easy consumption.	Taken 1/2 cup (50 ml) twice a day
	<i>Citrus reticulata</i> Blanco [Rutaceae]; ZRC 16657	<i>Serthlum</i>	T		Leaves		
8	<i>Carica papaya</i> L. [Caricaceae]; ZRC 16666	<i>Thingfanghma</i>	T	Jaundice	Leaves	The leaves and the aerial parts are boiled for 1 hr in water and the filtrate is taken internally in jaundice.	Taken 1 cup (100 ml) twice a day
	<i>Euphorbia royleana</i> Boiss. [Euphorbiaceae]; ZRC 22115	<i>Chawng</i>	S		Aerial parts		
9	<i>Centella asiatica</i> (L.) Urb. [Apiaceae]; ZRC 16641	<i>Lambak</i>	H	Blood purifier	Aerial parts	Material are taken in equal proportion and boiled in water and the filtrate is consumed.	100 ml twice a day.
	<i>Phyllanthus emblica</i> L. [Phyllanthaceae]; ZRC 16656	<i>Sunhlu</i>	T		Fruit		

Sl. No.	Scientific name [Family]; Collection No.	Local name	Habit	Disease	Parts used	Preparation, Administration & Storage	Dosage
10	<i>Cinchona officinalis</i> L. [Rubiaceae]; ZRC 16667	<i>Thingquinine</i>	T	Malaria	Leaves	500 g leaves of each species is boiled for 2-3 hrs in water and the filtrate is collected in a glass bottle and kept away from sunlight.	Taken 1 tablespoon (5 ml) twice a day.
	<i>Hoya griffithii</i> Hook.f. [Apocynaceae]; ZRC 16693	<i>Hnahchhah</i>	H		Leaves		
11	<i>Cordia fragrantissima</i> Kurz [Boraginaceae]; ZRC 16645	<i>Muk</i>	T	Hyperpigmentation in women	Bark	To 200 ml of sugarcane juice 200 ml of rice and 250 g of bark are added. The mixture is then boiled for 1 hr and the filtrate is administered internally.	Taken ½ cup (50 ml) twice daily.
	<i>Saccharum officinarum</i> L. [Poaceae]; ZRC 16690	<i>Fu</i>	S		Juice		
	<i>Oryza sativa</i> L. [Poaceae]; ZRC 22106	<i>Buh</i>	H		Rice beer		
12	<i>Dalbergia pinnata</i> (Lour.) Prain [Fabaceae]; ZRC 22129	<i>Tengtere</i>	T	Accelerating birth	Seed	The seeds in equal amounts are grinded and taken directly. This mixture should be made freshly before each administration	As desired by the medicine-man.
	<i>Lablab purpureus</i> (L.) Sweet [Fabaceae]; ZRC 22102	<i>Bepui</i>	C		Seed		
13	<i>Dillenia pentagya</i> Roxb. [Dilleniaceae]; ZRC 16634	<i>Kaihzawl</i>	T	Dysentery and stomach ulcer	Barks	500g each in equal proportions of the barks and 100g of the aerial parts of Pudina are boiled in 5l of water for 3-4 hrs to which 250g of sugar is added. The filtered water is then administered internally for stomach problems.	Taken 1/2 cup (50ml) 2 times per
	<i>Phyllanthus emblica</i> L. [Phyllanthaceae]; ZRC 16656	<i>Sunhlu</i>	T				
	<i>Aporosa octandra</i> (Buch. - Ham ex D.Don) Vickery [Phyllanthaceae]; ZRC 22116	<i>Chhawntual</i>	T				
	<i>Baccaurea ramiflora</i> Lour. [Phyllanthaceae]; ZRC 16651	<i>Pangkai</i>	T				
	<i>Psidium guajava</i> L. [Myrtaceae]; ZRC 16635	<i>Kawlthei</i>	T				
	<i>Helicia robusta</i> (Roxb.) R.Br.ex Blume [Proteaceae]; ZRC 16652	<i>Pasaltakaza</i>	T				
<i>Mentha arvensis</i> L. [Lamiaceae]; ZRC 16654	<i>Pudina</i>	H	Aerial parts				
14	<i>Melastoma malabaticum</i> L. [Melastomataceae]; ZRC 22103	<i>Builukham</i>	S	Dysentery and stomach ulcer	Leaves	1kg of the leaves and 5kg of the barks are boiled in water for 14hrs until a sticky fluid is obtained. The sticky fluid is collected for consumption.	Twice daily for 2 months.
	<i>Grevillea robusta</i> A. Cunn. ex R. Br. [Proteaceae]; ZRC 16658	<i>Sasaw</i>	T		Bark		
	<i>Dillenia indica</i> L. [Dilleniaceae]; ZRC 16636	<i>Kawrthingde ng</i>	T		Bark		
15	<i>Ficus rigida</i> Blume [Moraceae]; ZRC 16659	<i>Sehsen</i>	T	Hypertension	Bark	500g each of the materials are boiled in 3l of water for 2-3 hours and the filtrate is stored away from sunlight in a plastic bottle.	1 tablespoon (5ml) 3 times per day
	<i>Thunbergia grandiflora</i> (Roxb. Ex Rottl.) Roxb. [Acanthaceae]; ZRC 22124	<i>Vako</i>	C		Leaves		
16	<i>Carica papaya</i> L. [Caricaceae]; ZRC 16666	<i>Thingfanghma</i>	T	Kidney disorders	Fruit	500g each of the fruits without the seeds and leaves boiled in 2l of water for 30 minutes.	100ml taken thrice daily.
	<i>Morus alba</i> L. [Moraceae]; ZRC 16668	<i>Thingtheihmu</i>	T		Leaves		
17	<i>Helicia robusta</i> (Roxb.) R.Br. ex Blume [Proteaceae]; ZRC 16652	<i>Pasaltakaza</i>	T	Stomach ulcer	Root	The root bark of <i>Helicia robusta</i> are scrapped and dried without sunlight. In a large vessel 500g each of the materials are boiled in 10l of water for 3-4 hours and the filtrate is kept in a cold storage.	Taken 50ml twice daily.
	<i>Aporosa octandra</i> (Buch.-Ham. ex D.Don) Vickery [Phyllanthaceae]; ZRC 22116	<i>Chhawntual</i>	T		Bark		
	<i>Callicarpa arborea</i> Roxb. [Lamiaceae]; ZRC 16692	<i>Hnahkiah</i>	T		Bark		
	<i>Schima wallichii</i> (DC.) Korth [Theaceae]; ZRC 16637	<i>Khiang</i>	T		Bark		
	<i>Dillenia pentagya</i> Roxb. [Dilleniaceae]; ZRC 16634	<i>Kaihzawl</i>	T		Bark		

Sl. No.	Scientific name [Family]; Collection No.	Local name	Habit	Disease	Parts used	Preparation, Administration & Storage	Dosage
18	<i>Helicia robusta</i> (Roxb.) R.Br. ex Blume [Proteaceae]; ZRC 16652	<i>Pasaltakaza</i>	T	Uterus problems	Root-bark	Root bark 1kg dried, bark 1kg each, 500g of leaves, root 100g. Root stock around 1.6 inch in diameter are boiled in 3l of water with 1 tablespoon of sugar for 3-4 hrs. The water is then filtered out with a thin cotton cloth and stored in a plastic bottle.	Taken 50ml twice daily.
	<i>Aporosa octandra</i> Buch.-Ham ex D. Don [Phyllanthaceae]; ZRC 22116	<i>Chhawntual</i>	T		Bark		
	<i>Baccaurea ramiflora</i> Lour. [Phyllanthaceae]; ZRC 16651	<i>Pangkai</i>	T		Bark		
	<i>Cajanus cajan</i> (L.) Millsp. [Leguminosae]; ZRC 22104	<i>Behliang</i>	S		Leaves		
	<i>Thysanolaena latifolia</i> (Roxb. ex Hornem.) Honda [Poaceae]; ZRC 16694	<i>Hmunphiah</i>	S		Root		
	<i>Mangifera indica</i> L. [Anacardiaceae]; ZRC 16669	<i>Theihai</i>	T		Bark		
	<i>Dioscorea alata</i> L. [Dioscoreaceae]; ZRC 22117	<i>Changchaldawn</i>	C				
19	<i>Helicia robusta</i> (Roxb.) R.Br. ex Blume [Proteaceae]; ZRC 16652	<i>Pasaltakaza</i>	T	Used as vitamins	Bark	The barks of <i>Helicia robusta</i> are scrapped and sun dried. The fruits of gooseberry are also sundried excluding the seeds. The leaves are also sundried. These 500g each of the sundried materials are then mixed thoroughly. The infusion of these plants is then taken as vitamins.	Taken as convenient by the patient.
	<i>Phyllanthus emblica</i> L. [Phyllanthaceae]; ZRC 16656	<i>Sunhlu</i>	T		Fruit		
	<i>Girardinia palmata</i> L. [Urticaceae]; ZRC 16638	<i>Kangthai</i>	S		Leaves		
20	<i>Inula cappa</i> (Buch.-Ham. ex D. Don) DC. [Compositae]; ZRC 22105	<i>Buarthau</i>	H	Colon ulcer	Aerial parts	600g of the aerial parts and 400g of root stock are grinded and the juice is squeezed out and taken directly for ulcer.	Taken 5ml twice daily
	<i>Curcuma longa</i> L. [Zingiberaceae]; ZRC 22111	<i>Aieng</i>	H		Root stock		
21	<i>Jasminum nervosum</i> Lour. [Oleaceae]; ZRC 16646	<i>Maufimhlo</i>	H	Regulation of menstrual cycle in women and also for kidney problems	Aerial parts,	2kg of rice is cooked and cooled down to which 50g of yeast is added and put it in a steel container. 1 medium sized plant of <i>Jasminum nervosum</i> is inserted. The lid is sealed tightly and after 4 days the water that is collected from the bottom of the container is taken for consumption.	1 tablespoon (5ml) 5 times per day.
	<i>Oryza sativa</i> L. [Poaceae]; ZRC 22106	<i>Buh (Zufang)</i>	H		Juice of the Fermented rice/ Rice beer		
22	<i>Lobelia angulata</i> G. Forst [Campanulaceae]; ZRC 22118	<i>Choakthi</i>	H	Sore gums	Fruit	3-4 fruits and leaves are grinded and make it into a thick paste. It is applied directly inside the mouth.	Applied for about 15-20 minutes.
	<i>Persicaria chinensis</i> (L.) H. Gross [Polygonaceae]; ZRC 16670	<i>Taham</i>	H		Leaves		
23	<i>Melocanna baccifera</i> (Roxb.) Kurz [Poaceae]; ZRC 16647	<i>Mautak</i>	T	Sore throat	Vinegar	1l each of bamboo vinegar is mixed with 1l of fresh neem juice and dilute with water.	5ml of the mixture diluted with 5ml of water taken thrice daily.
	<i>Citrus aurantifolia</i> Swingle [Rutaceae]; ZRC 16650	<i>Nimbu</i>	S		Fruit		
24	<i>Mimosa pudica</i> L. [Leguminosae]; ZRC 16691	<i>Hlonuar</i>	H	Kidney problems	Leaves	The leaves are boiled in equal proportions in large quantity for 1 hour and the filtrate is taken internally in kidney problems.	Taken 100ml twice daily.
	<i>Hedyotis scandens</i> Roxb. [Rubiaceae]; ZRC 16633	<i>Kelhnamtur/ Laikingtuibur</i>	C		Leaves		
	<i>Elaeagnus pyriformis</i> Hook.f. [Elaeagnaceae]; ZRC 16660	<i>Sarzuk</i>	S		Leaves		

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25	<i>Momordica charantia</i> L. [Cucurbitaceae]; ZRC 22119	<i>Changkha</i>	C	Scabies	Aerial parts	200g each of the aerial parts are boiled in 1l of water for 30 mins and the cooled filtrate is applied externally for dressing scabies.	Dressing is done only in the morning.																																																																																																																																							
	<i>Scoparia dulcis</i> L. [Plantaginaceae]; ZRC16653	<i>Perhpawngc haw</i>	H		Aerial parts			26	<i>Piper beetle</i> L. [Piperaceae]; ZRC 22125	<i>Panhmah</i>	C	Asthma	Leaves	20 leaves of <i>Piper beetle</i> , 100g of root stock, 100g of the other leaves are grinded and the juice is squeezed out which is taken directly. This mixture should be made freshly for each administration.	1 tablespoon (5ml) twice daily. In severe cases thrice daily.	<i>Zingiber officinale</i> Roscoe [Zingiberaceae]; ZRC 16661	<i>Sawhthing</i>	H	Root stock	<i>Ampelocissus latifolia</i> Roxb. Planch [Vitaceae]; ZRC 16695	<i>Hruipawl</i>	C	Leaves	<i>Prunus domestica</i> L. [Rosaceae]; ZRC 22126	<i>Japan theite</i>	T	Leaves	27	<i>Prunus undulata</i> Buch. – Ham. ex D. Don [Rosaceae]; ZRC 16671	<i>Theiarlung</i>	T	Heart problems	Leaves	500g of the leaves and 7 leaves of Pudina are boiled in 1l of water and the filtrate is taken internally	Taken 50ml twice daily.	<i>Mentha arvensis</i> L. [Lamiaceae]; ZRC 16654	<i>Pudina</i>	H	Aerial parts	28	<i>Rhus chinensis</i> Mill. [Anacardiaceae]; ZRC 16639	<i>Khawmhma</i>	T	Unhealthy babies	Fruit	500ml each of the juices of both the plants are mixed in equal quantity and taken along with sugar for easy consumption.	1 tablespoon (5ml) twice daily	<i>Centella asiatica</i> (L.) Urb. [Apiaceae]; ZRC16641	<i>Lambak</i>	H	Aerial parts	29	<i>Senecio scandens</i> Buch.-Ham. Ex D. Don [Compositae]; ZRC 16662	<i>Saiekhlo</i>	C	Wounds	Aerial parts	The materials are grinded in equal proportions and make into thick paste. The paste is applied directly onto wounds or the juices are squeezed out and applied directly.	Applied only once in order to prevent infection.	<i>Scoparia dulcis</i> L. [Plantaginaceae]; ZRC 16653	<i>Perhpawngc haw</i>	H	Aerial parts	30	<i>Sesamum indicum</i> L. [Pedaliaceae]; ZRC 22120	<i>Chhawhchhi</i>	H	Bald hair and rejuvenation of skin	Seed oil	In equal proportions the oils are mixed and applied externally	Applied whenever it is convenient by the medicine-men.	<i>Olea europaea</i> L. [Oleaceae]; ZRC 42200	<i>Olive</i>	T	Seed oil	31	<i>Smilax glabra</i> Roxb. [Smilacaceae]; ZRC 16672	<i>Thuang-ngil</i>	C	Arthritis, sciatica	A small portion of the green twigs of the fermented rice	2kg of rice is cooked and cooled down to which 50g of yeast is added and put it in a steel container. A portion of the green twig of <i>Smilax glabra</i> mostly 2 inch long is also inserted. The lid is sealed tightly and after 4 days the water that is collected from the bottom of the container is taken for consumption.	1 cup (100ml) taken every day before bed.	<i>Oryza sativa</i> L. [Poaceae]; ZRC 22106	<i>Buh</i>	H	32	<i>Asparagus racemosus</i> Willd. [Asparagaceae]; ZRC 22112	<i>Arkezungbaw</i>	H	Whooping cough	Root stock	The materials are boiled for 30 mins and the filtrate is collected in a plastic bottle.	Taken once in a day in 100ml.	<i>Justicia adhatoda</i> L. [Acanthaceae]; ZRC 22121	<i>Chhawldai</i>	S	Leaves	33	<i>Vitex peduncularis</i> Wall. ex Schauer [Lamiaceae]; ZRC 16673	<i>Thingkhavilu</i>	T	Typhoid	Leaves	2-3 kg each of the leaves are boiled in 5l of water and after 1-2 hours the cooled filtrate is taken internally. It can be stored for a long period of time if kept in a cold storage.	100ml thrice daily.	<i>Haldina cordifolia</i> (Roxb.) Ridsdale [Rubiaceae]; ZRC 16644	<i>Lungkhup(Azik sen)</i>	T	Leaves	34	<i>Ananas comosus</i> (L.) Merr. [Bromeliaceae]; ZRC 16643	<i>Lakhuithai</i>	H	Hiccups	Fruits	The outer scales of the fruits are removed and 2-3 small grinded seeds of <i>Piper nigrum</i> are added and taken directly.	As convenient by the patient.	<i>Piper nigrum</i> L. [Piperaceae]; ZRC 16674	<i>Thingmarcha</i>	H	Seed	35	<i>Cinnamomum verum</i> J.Presl [Lauraceae]; ZRC 16675	<i>Thakthing</i>	T	Jaundice	Root bark	The materials are grinded and boiled to which sugar is added. The water is then filtered out with a thin piece of cotton cloth.	50ml taken twice per day.	<i>Curcuma longa</i> L. [Zingiberaceae]; ZRC 22111	<i>Aieng</i>	H	Root stock	36	<i>Azadirachta indica</i> A. Juss [Meliaceae]; ZRC 16649	<i>Nimpata</i>	T	Ringworm	Leaves	2-3 leaves are first burnt in fire the ashes are then collected which is grinded with 7-8 drops of coconut oil. It is applied directly.	As convenient by the patient.
26	<i>Piper beetle</i> L. [Piperaceae]; ZRC 22125	<i>Panhmah</i>	C	Asthma	Leaves	20 leaves of <i>Piper beetle</i> , 100g of root stock, 100g of the other leaves are grinded and the juice is squeezed out which is taken directly. This mixture should be made freshly for each administration.	1 tablespoon (5ml) twice daily. In severe cases thrice daily.																																																																																																																																							
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27	<i>Prunus undulata</i> Buch. – Ham. ex D. Don [Rosaceae]; ZRC 16671	<i>Theiarlung</i>	T	Heart problems	Leaves	500g of the leaves and 7 leaves of Pudina are boiled in 1l of water and the filtrate is taken internally	Taken 50ml twice daily.																																																																																																																																							
	<i>Mentha arvensis</i> L. [Lamiaceae]; ZRC 16654	<i>Pudina</i>	H		Aerial parts																																																																																																																																									
28	<i>Rhus chinensis</i> Mill. [Anacardiaceae]; ZRC 16639	<i>Khawmhma</i>	T	Unhealthy babies	Fruit	500ml each of the juices of both the plants are mixed in equal quantity and taken along with sugar for easy consumption.	1 tablespoon (5ml) twice daily																																																																																																																																							
	<i>Centella asiatica</i> (L.) Urb. [Apiaceae]; ZRC16641	<i>Lambak</i>	H		Aerial parts																																																																																																																																									
29	<i>Senecio scandens</i> Buch.-Ham. Ex D. Don [Compositae]; ZRC 16662	<i>Saiekhlo</i>	C	Wounds	Aerial parts	The materials are grinded in equal proportions and make into thick paste. The paste is applied directly onto wounds or the juices are squeezed out and applied directly.	Applied only once in order to prevent infection.																																																																																																																																							
	<i>Scoparia dulcis</i> L. [Plantaginaceae]; ZRC 16653	<i>Perhpawngc haw</i>	H		Aerial parts																																																																																																																																									
30	<i>Sesamum indicum</i> L. [Pedaliaceae]; ZRC 22120	<i>Chhawhchhi</i>	H	Bald hair and rejuvenation of skin	Seed oil	In equal proportions the oils are mixed and applied externally	Applied whenever it is convenient by the medicine-men.																																																																																																																																							
	<i>Olea europaea</i> L. [Oleaceae]; ZRC 42200	<i>Olive</i>	T		Seed oil																																																																																																																																									
31	<i>Smilax glabra</i> Roxb. [Smilacaceae]; ZRC 16672	<i>Thuang-ngil</i>	C	Arthritis, sciatica	A small portion of the green twigs of the fermented rice	2kg of rice is cooked and cooled down to which 50g of yeast is added and put it in a steel container. A portion of the green twig of <i>Smilax glabra</i> mostly 2 inch long is also inserted. The lid is sealed tightly and after 4 days the water that is collected from the bottom of the container is taken for consumption.	1 cup (100ml) taken every day before bed.																																																																																																																																							
	<i>Oryza sativa</i> L. [Poaceae]; ZRC 22106	<i>Buh</i>	H																																																																																																																																											
32	<i>Asparagus racemosus</i> Willd. [Asparagaceae]; ZRC 22112	<i>Arkezungbaw</i>	H	Whooping cough	Root stock	The materials are boiled for 30 mins and the filtrate is collected in a plastic bottle.	Taken once in a day in 100ml.																																																																																																																																							
	<i>Justicia adhatoda</i> L. [Acanthaceae]; ZRC 22121	<i>Chhawldai</i>	S		Leaves																																																																																																																																									
33	<i>Vitex peduncularis</i> Wall. ex Schauer [Lamiaceae]; ZRC 16673	<i>Thingkhavilu</i>	T	Typhoid	Leaves	2-3 kg each of the leaves are boiled in 5l of water and after 1-2 hours the cooled filtrate is taken internally. It can be stored for a long period of time if kept in a cold storage.	100ml thrice daily.																																																																																																																																							
	<i>Haldina cordifolia</i> (Roxb.) Ridsdale [Rubiaceae]; ZRC 16644	<i>Lungkhup(Azik sen)</i>	T		Leaves																																																																																																																																									
34	<i>Ananas comosus</i> (L.) Merr. [Bromeliaceae]; ZRC 16643	<i>Lakhuithai</i>	H	Hiccups	Fruits	The outer scales of the fruits are removed and 2-3 small grinded seeds of <i>Piper nigrum</i> are added and taken directly.	As convenient by the patient.																																																																																																																																							
	<i>Piper nigrum</i> L. [Piperaceae]; ZRC 16674	<i>Thingmarcha</i>	H		Seed																																																																																																																																									
35	<i>Cinnamomum verum</i> J.Presl [Lauraceae]; ZRC 16675	<i>Thakthing</i>	T	Jaundice	Root bark	The materials are grinded and boiled to which sugar is added. The water is then filtered out with a thin piece of cotton cloth.	50ml taken twice per day.																																																																																																																																							
	<i>Curcuma longa</i> L. [Zingiberaceae]; ZRC 22111	<i>Aieng</i>	H		Root stock																																																																																																																																									
36	<i>Azadirachta indica</i> A. Juss [Meliaceae]; ZRC 16649	<i>Nimpata</i>	T	Ringworm	Leaves	2-3 leaves are first burnt in fire the ashes are then collected which is grinded with 7-8 drops of coconut oil. It is applied directly.	As convenient by the patient.																																																																																																																																							
	<i>Cocos nucifera</i> L. [Arecaceae]; ZRC 22122	<i>Coconut</i>	T		Oil																																																																																																																																									

Sl. No.	Scientific name [Family]; Collection No.	Local name	Habit	Disease	Parts used	Preparation, Administration & Storage	Dosage
37	<i>Gossypium hirsutum</i> L. [Malvaceae]; ZRC 16642	<i>La</i>	S	Enlarged serrotum	Seed	Root stock are first dried in sunlight which is then grinded with the seeds in equal proportions and applied externally on the affected areas.	Applied once in a day.
	<i>Zingiber officinale</i> Roscoe [Zingiberaceae]; ZRC 16661	<i>Sawhthing</i>	H		Root stock		
38	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht [Costaceae]; ZRC 16655	<i>Sumbul</i>	H	Kidney stone	Root	The materials are grinded in equal proportions and boiled.	50 ml once a day.
	<i>Mimosa pudica</i> L. [Leguminosae]; ZRC16691	<i>Hlonuar</i>	H		Root		
	<i>Catharanthus roseus</i> (L.) G. Don [Apocynaceae]; ZRC 16640	<i>Kumtluang</i>	S		Leaves		
39	<i>Parkia timoriana</i> (DC.) Merr. [Leguminosae]; ZRC 22130	<i>Zawngtah</i>	T	Anthelmint hic	Bark	The materials in equal proportions are grinded and taken directly.	Taken in a small amount once a day.
	<i>Mangifera indica</i> L. [Anacardiaceae]; ZRC 16669	<i>Theihai</i>	T		Bark		
40	<i>Solanum anguivi</i> Lam. [Solanaceae]; ZRC 16676	<i>Tawkte</i>	S	Epilepsy	Root	One medium sized root is grinded and bring it to boil with a handful of rice. The filtrate is then taken internally for epilepsy.	50 ml once a day.
	<i>Oryza sativa</i> L. [Poaceae]; ZRC 22106	<i>Buh</i>	H		Rice- water		
41	<i>Breonia chinensis</i> (Lam.) Capuron [Rubiaceae]; ZRC 22107	<i>Banphar</i>	T	Tuberculos is	Bark	1kg of the barks and 30 tender leaves are crushed and boiled with 3l of water which is then cooled down and the filtrate is collected in a glass bottle.	1 cup (100ml) thrice per day for 15 days. The patient must not eat any meat during these 15 days.
	<i>Vitex peduncularis</i> Wall. ex Schauer [Lamiaceae]; ZRC 16673	<i>Thingkhualtu</i>	T		Tender leaves		
42	<i>Musa x paradisiaca</i> L. [Musaceae]; ZRC 22108	<i>Balhla</i>	T	Ear problems	Tender leaves	500g of the barks and 1 large tender leaf are crushed and the juice is squeezed out and applied into the ear.	1-2 drops once in a day.
	<i>Derris robusta</i> (DC.) Benth. [Leguminosae]; ZRC 16677	<i>Thingkha</i>	T		Bark		
43	<i>Boesenbergia longiflora</i> (Wall.) Kuntze [Zingiberaceae]; ZRC 22113	<i>Ailaidum</i>	H	Sinus	Root stock	One medium sized root stock and 50ml of the seed oil are crushed and the oily water obtained from it is collected and dropped into the nose.	1-2 drops once in a day
	<i>Sesamum indicum</i> L. [Pedaliaceae]; ZRC22121	<i>Chhahwhchi</i>	S		Seed oil		
44	<i>Blumea lanceolaria</i> Roxb. Druce [Compositae]; ZRC 22101	<i>Buarze</i>	S	Ovary disorders	Leaves	The leaves and the whole plants are boiled for 3 hours to which 1l of the pounded juice of the rhizome is added along with 250g of the root bark. It is boiled for 1 hr and filtered out for consumption with 1 teaspoon of honey.	10ml twice a day for 40 days.
	<i>Phyllanthus fraternus</i> G.L. Webster. [Phyllanthaceae]; ZRC 16648	<i>Mitthisunhlu</i>	H		Whole		
	<i>Scoparia dulcis</i> L. [Plantaginaceae]; ZRC 16653	<i>Perhpwngch aw</i>	H		Whole		
	<i>Curcuma longa</i> L. [Zingiberaceae]; ZRC 22111	<i>Aieng</i>	H		Rhizo me		
	<i>Rothea serrata</i> (L.) Steane & Mabb. [Lamiaceae]; ZRC 22127	<i>Phuihnam chhia</i>	S		Root bark		
45	<i>Trichosanthes cucumerina</i> L. [Cucurbitaceae]; ZRC 22131	<i>Berul</i>	C	Fever	Leaves	The materials in equal proportions are crushed and boiled. The filtrate is taken as medicine for fever.	1 cup (100ml) twice daily.
	<i>Marsdenia macrophylla</i> (Humb. & Bonpl. ex Schult.) E.Fourn. [Apocynaceae]; ZRC 22114	<i>Ankhapui</i>	C		Leaves		

In the present study a total of 82 plant species belonging to 76 genera from 50 families, which are used in 45 formulations are documented. Plants are mostly collected from the wild whereas some of the species are cultivated at home gardens. Therefore home gardens played an important role in the conservation of these medicinal plants.

Taxonomic analysis shows that Poaceae, Lamiaceae, Phyllanthaceae and Rubiaceae are the highest utilized family that contribute 4 species each, followed by Fabaceae, Apocynaceae and Zingiberaceae contributing 3 species each, whereas the rest are less

represented. In most of the formulations fresh water is used as the main solvent. Of the 45 formulations 5 are reported to be administered externally while the rest are used/ administered internally. The doses are usually measured in terms of teaspoonful (5 ml), tablespoon (10 ml) and a cup or half of a cup (100 ml or 50 ml).

Callicarpa arborea is used in 5 formulations for the treatment of stomach problems like renal colic, stomach ulcer etc. Shankar & Rawat (2012) also reported that it is used for treating colic ulcer in the western part of Mizoram. In Malaysian Traditional medicine this plant is used effectively for the treatment of stomach pain and dysentery (Alsarhan *et al.* 2014). *Helicia robusta* and *Phyllanthus emblica* are also used in 4 formulations respectively. It is observed that instead of single drug, the local people usually prefer medicines prepared from 2 or more species as they thought that these combined medicines are more powerful. This is also generally followed by most of the herbal healers.

Some herbal healers are very difficult to approach while some freely shared their knowledge. At present the traditional knowledge about herbal medicines is vanishing rapidly due to change in lifestyles or westernization and many Government implemented health projects. Instead of practicing the traditional methods, the present generations usually prefer using allopathic medicines. However in some cases these herbal medicines are also used to run a small scale business but the costs are usually much low compared to allopathic medicines.

CONCLUSION

The present study is an attempt to document the different types of plants used by the herbal healers of Mizoram for the treatment of various ailments or diseases. However, the recorded formulations need to be scrutinized clinically and observed pharmacologically. Phytochemical analysis of this knowledge is very important in order to validate these folklore claims.

Acknowledgements

The authors are thankful to the herbal practitioners, knowledgeable persons and the community people for sharing their valuable knowledge and information. Their assistance and guidance during the field work are also deeply acknowledged. Authorities of Botanical Survey of India, Eastern Circle, Shillong are also thankfully acknowledged for their kind help in consulting Herbarium.

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