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Quantitative ethnobotanical study of medicinal plants used by Karen people of Wah-Theinkha village in Kawmhu Township, Myanmar

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Abstract

The objective of this study was to document on ethnomedicinal plants, which was collected from the Karen indigenous people of Wah-Theinkha village in Kawhmu Township. The information was obtained through open-ended, semi-structured interviews. This study was able to identify 43 medicinal plants taxa in 29 families used in 17 categories of diseases. Plants with the highest recorded UVs were *Vitex trifolia* L. (0.88) and *Ageratum conyziodes* (L.) L (0.86). The lowest number of UV (0.18) was *Talinum paniculatum* (Jacq.) Gaertn. The highest ICF value (1.00) was cited for Category 7 (diseases of the eye aliments). *Stachytarpheta jamaicensisis* (L.) Vahl is used to antidote which showed the highest fidelity level (92%). The knowledge of using medicinal plants was significantly different based on the village location, informant educational status, gender and age. The result showed that the application of traditional medicinal plants on ailments is still widespread in the study area. Documentation of new ethnomedicinal species with their therapeutic uses will be promoted further phytochemical and pharmacological investigations and possibly lead to the development of new drugs.

Keywords: Ethnomedicinal plants, Karen indigenous, traditional medicine, Wah-Theinkha village, ailments

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1. Introduction

In Myanmar, wild plants have long been used as a source of medicine. Traditional medicine is widely practiced in Myanmar by the majority of the population either as an alternate or as a supplement to modern medicine [1].

Kawhmu Township is located in Southern Yangon District, Yangon Region, Myanmar. It is at 16°30′0″N and 96°10′0″*E* [2]. Wah-Theinkha is a small rural village in Kawhmu Township. The majority of village's population is Karen ethnic, and most are rice farmers. In Kawhmu Township, 42.2 per cent of the employed persons aged 15-64 are skilled agricultural, forestry and fishery workers and also the highest proportion in the village followed by 21 per cent in elementary occupations [3].

Ethnobotany is the discipline related to study of plants concerning with their traditional uses and with the management of plant resources viewed from an historical perspective [4]. In Myanmar, ethnobotany has been focused in many studies in recent times, but the emphasis has been on medicinal properties and the subsequent financial benefits and incentive for local communities [5].

The use of traditional medicinal practices and knowledge becomes gradually decreased and less popular because of increasing popularity of modern medicines. As a consequence, traditional medicinal knowledge was in danger of extinction [6]. Therefore, the main objective of this study was to investigate the ethnomedicinal plant species and their uses in traditional therapies used by local people of the study area.

2. Materials and Methods

The study is conducted from November 2018 to December 2019 in Wah-Theinkha village, Kawhmu Township, Yangon Region. A total of 50 informants were open-ended, semi-structured interviews regarding to the utilization of plant for medicinal purposes. Taxonomic identification was done in the Botany Department, University of Yangon. The collected plants were identified by the Flora of Hong Kong [7], Flora of Java [8], Flora of Ceylon [9] and A Checklist of Trees, Shrubs, Herbs and Climbers of Myanmar [10].

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Table 1. Medicinal plants used by the Karen-ethnic groups in Kawmhu Township.

No	Plant Species and family	Vernacular name	Part used	Disease or purpose	No.of use-report	Use Value (UV)
1.	*Andrographis paniculata* Nees. **Acanthaceae**	Say Khar Gyii	Lf, Wh	Diabetes, cough, skin diseases, malaria, diarrhoea	37	0.74
2.	*Asystasia gangetica*(L.) T. Anderson **Acanthaceae**	Kyauk Kwè	Lf, Wh	Nephrolithiasis, hemoptysis, urinary lithiasis	29	0.58
3.	*Barleria cristata* L. **Acanthaceae**	Leik tha ywe	Lf, Wh	Abscess, inflammation, toothache, diabetes, knee pain	23	0.46
4.	*Achyranthes aspera* L. **Amaranthaceae**	Khwè-nakhaung cheik	Wh, Lf, Rz	Indigestion, headache, abscess, fever	28	0.56
5.	*Bouea oppositifolia* (Roxb.) Adelb. **Anacardiaceae**	Ma Yan	Ft	Dysentery	25	0.5
6.	*Dregea volubili s* (L.f.) Benth. ex Hook.f **Apocynaceae**	Gwe Tauk	Lf	Rheumatic pain, skin wound	22	0.44
7.	*Aristolochia indica* L. **Aristolochiaceae**	Eik thara muli	Sd, Lf	Cancer, ulcer, tumor, antitoxin	12	0.24
8.	*Haplophragma adenophylla* (Wall. Ex G. Don) Steenis **Bignoniaceae**	Phet Than	Ft, St, Bk	Dysentery, muscular tension, demulcent, scabies	22	0.44
9.	*Oroxylum indicum* (L.) Kurz. **Bignoniaceae**	Kyaungsha	Ft, Lf, Wh, Bk, Fr	Tinnitus, asthma, inflammation	27	0.54
10.	*Heliotropium indicum* L. **Boraginaceae**	Sin hna - maung	Wh	Nephrolithiasis, polyuria, urinary lithiasis, kidney disease, cancer	25	0.50
11.	*Cleome rutidosperma* DC. **Cleomaceae**	Taw Hin - Galar	Wh, Ft	Constipation, asthma, diarrhoea	30	0.6
12.	*Ageratum conyziodes* (L.) L. **Compositae**	Kwe thay pan	Lf, Wh	Cough, fever, asthma, wounds	43	0.86
13.	*Chromolaena odorata* (L.) R.M. King. & H. Rob. **Compositae**	Taw Bi sat	Lf	Skin wound, eye pain, cancer, wound, tuberculosis, asthma, cough	29	0.58
14.	*Eclipta prostrata* (L.) L. **Compositae**	Kyeik Man	Lf, Wh, Ft	Menstrual disorders, skin burn, skin diseases, scar, cut, hair black	40	0.80
15.	*Elephantopus mollis* Kunth. **Compositae**	Kyar mote sate	Lf, Wh	Hypotension, diarrhoea	24	0.48
16.	*Euphorbia tithymaloides* L. **Euphorbiaceae**	Gong Ga Man	Lf	Wounds, abscess, blister, boil	38	0.76
17.	*Clerodendrum indicum* (L.) Kuntze **Lamiaceae**	NgaYant Padu	Lf, Fr, Rt	Diabetic, dysentery, tumor, hypertension, earache, Hepatitis, gonorrhea, influenza	33	0.66
18.	*Ocimum americanum* L. **Lamiaceae**	Pin sein	Lf, Sd	Poison, snake bite, scabies, cough	20	0.40
19.	*Vitex trifolia* L. **Lamiaceae**	Kyaung pan	Lf, Wh	Fever, child fever, asthma, dysentery, cough, abscess	44	0.88
20.	*Mimosa pudica* L. **Leguminosae**	Htika yon	Wh	Diaphoretic, pile	31	0.62
21.	*Mucuna pruriens* (L.) DC. **Leguminosae**	Khwe layar	Sd	Tonic, cancer, sleepiness, heart disease, diabetes, hypertension, poison, antitoxin	29	0.58
22.	*Tadehagi triquetrum* (L.) H. Ohashi **Leguminosae**	LaukThay	Lf, Wh, Rz	Antiseptic, itch, nephrolithiasis, tuberculosis, hepatitis, lung cancer	27	0.54
23.	*Magnolia grandiflora* L. **Magnoliaceae**	Ta Daing Mwe	Rt, Fr, Bk	Abscess, diaphoretic, itch, sore	14	0.28
24.	*Corchorus olitorius* L. **Malvaceae**	Pi law Yine	Lf	Arthritis, nerve pain, knee cover, dysentery, fever	28	0.56
25.	*Maranta arundinacea* L. **Marantaceae**	Thin	Rt, St	Antidote, piles	19	0.38
26.	*Syzygium jambos* (L.) Alston **Myrtaceae**	Thakyar Thi	Ft, Lf	Fever	26	0.52
27.	*Averrhoa carambola* L. **Oxalidaceae**	Zaung layar	Ft	Hypertension, dizzy, urinary lithiasis, itch	36	0.72
28.	*Pandanus amaryllifolius* Roxb. **Pandanaceae**	Swan Hmwe	Lf	Fever, skin disease	20	0.4
29.	*Phyllanthus chamaepeuce* Ridl. **Phyllanthaceae**	Taung Zee Phyu	Wh, Lf, Rt	Cough, hepatitis, cardiac disease, heart diseases, kidney diseases	31	0.62
30.	*Phyllanthu semblica* L. **Phyllanthaceae**	Taw zee phyu	Ft	Heart diseases, diabetes, constipation, menstrual disease, cancer, stomachic	22	0.44

Table 1. (cont.) Medicinal plants used by the Karen-ethnic groups in Kawmhu Township.

No	Plant Species and family	Vernacular name	Part used	Disease or purpose	No.of use-report	Use Value (UV)
31.	*Sauropus androgynous* (L.) Merr. **Phyllanthaceae**	Kyet Tha Hinn	Lf, Wh	Cough, hepatitis-B, hepatitis-C	30	0.6
32.	*Peperomia pellucida*(L.) **Piperaceae**	Thit yay Gyii pin	Wh, Lf	Cataract, cancer, breast cancer	31	0.62
33.	*Piper nigrum* L. **Piperaceae**	Nga yoke Kaung	Sd, Lf, Ft	Fever, toothache, diarrhoea, cough	34	0.68
34.	*Scoparia dulcis* L. **Plantaginaceae**	Dana thu kha	Wh, Lf	Toothache, asthma, cough	26	0.52
35.	*Cymbopogon citratus* (DC.) Stapf. **Poaceae**	Sa balin	Lf, St, Rz	Arthritic joints, boils	27	0.54
36.	*Polygonum tomentosum* Willd. **Polygonaceae**	Ma Har Karkyan Sit	Wh, Lf	Arthritis, edema, poisonous, wounds, constipation	27	0.54
37.	*Solanum indicum* L. **Solanaceae**	Khayan kazaw	Ft, Lf	Hypertension, fever, gonorrhea, menstrual disorders	27	0.54
38.	*Physalis minima* L. **Solanaceae**	Bauk Thi	Lf, Ft	Cystitis, wound, hypertension, inflammation, purgative	22	0.44
39.	*Talinum paniculatum* (Jacq.) Gaertn. **Talinaceae**	Ginn Sin	Rt	Diabetes	9	0.18
40.	*Stachytarpheta jamaicensis* (L.) **Verbenaceae**	A seik ta yar	Lf, Wh	Snake bite, scorpion bite, antidote, antitoxin	32	0.64
41.	*Cissus quadrangularis* L. **Vitaceae**	Shazaung let set	Wh, Lf	Broken bone, dislocate, cancer	29	0.58
42.	*Curcuma longa* L. **Zingiberaceae**	Na nwin	Rz, Lf, Rt	Rheumatism, dysentery, wounds, headaches, diarrhoea, stomachaches, skin care	41	0.82
43.	*Hedychium gracile* Roxb. **Zingiberaceae**	Padè Kaw	Rz, Ft, St	Dysentery, diarrhea, stomach	26	0.52

*Remark Rt: Root, Ft: Fruit, Lf: leaf, Wh: Whole Plant, Bk: bark, St: stem, Rz: Rhizome, Sd: seed, Yst: Young stem.

Quantitatively, the ethnobotanical data were analyzed by Use Value (UV) [11, 12], Informant consensus factor (ICF) [13] and Fidelity (FL %) [14].

3. Results and Discussion

3.1 Ethnomedicinal plants and the parts

The present investigation dealt with 43 species of ethnomedicinal plants belonging to 29 families (Table 1). The highest numbers of the recorded ethnomedicinal plants were from the Compositae (four species) followed by the Leguminoceae and Acanthaceae (three species each) then the Euphorbiaceae, Zingiberaceae, Solanaceae, Verbenaceae, Bignoniaceae, Piperaceae and Lamiaceae which having two species each. Most of these families were used for edible and medicinal plants. However, most of the plants from these 29 families are documented that these plants contained active constituents and processed as qualified traditional medicine. Of all recorded species, herbs (26 species) were found to account for the greatest number followed by trees (10 species), climber (4 species) and shrubs (3 species).

3.2 Quantitative analysis

3.2.1 Use report

A total of 1200 use reports have been documented in this study which is categorized in seventeen different ailments (Table 2). These include disease of gastrointestinal illness aliment totally 216 use reports from 39 taxa which is the highest number record. It is therefore noted that the gastrointestinal illness aliment is the highest category in Myanmar [15].

3.2.2 Use value (UV)

The results of the use value of 43 plant species revealed that *Vitex trifolia* L. has the highest number of use report (44) and UV (0.88). The second highest number of use report (43) and UV (0.86) were *Ageratum conyziodes* (L.) L. The decoction of whole plants and leaves of *V. trifolia* L. is used to treat fever, asthma, dysentery, cough and abscess. Water from boiling the leaves is ingested for weakness and weight loss, malaria, menstrual problems, and conditions related to birthing, as well as for coughs and colds in infants and young children. *V. trifolia* L. dry leaf powder consumed orally for body swollen and tinnitus, decoction of flowers leaves consumed orally for malaria [16]. The fresh juice and decoction of *A. conyziodes* L. leave used to treat cough, fever, asthma and wound. The cold infusion of *A. conyziodes* (L.) L. leaves used to wash sore. Serves as an antiseptic for skin diseases and leprosy [16, 17]

The lowest number of use report (9) and UV (0.18) was obtained from *Talinum paniculatum* (Jacq.) Gaertn. (Table 1). The decoction of root of *T. paniculatum* (Jacq.) Gaertn is used to treat diabetes. The medicinal plant species with low UV are also very important and should not be ignored as failing to declare them to upcoming generations which could raise

Table 2. Categories Informant Consensus Factor (ICF) aliment categories.

Sr. no.	Aliment Categories	Number of use report (N_{ur})	Number of taxa (N_t)	Informant Consensus Factor (ICF)
1	Gastrointestinal aliments	216	39	0.82
2	Respiratory aliments	123	22	0.82
3	Fever aliments	125	17	0.87
4	Tumor aliments	46	11	0.77
5	Diabetes aliments	33	7	0.86
6	Migraine aliments	40	4	0.92
7	Eye aliments	6	1	1
8	Ear aliments	23	2	0.95
9	Blood pressure aliments	38	8	0.81
10	Dermatological aliments	91	17	0.82
11	Muscular skeletal aliments	63	9	0.87
12	Urinary genital tract infection aliments	196	24	0.88
13	Poisonous bites aliments	76	9	0.89
14	Injury cause by external factors aliments	48	13	0.74
15	Liver aliments	22	6	0.76
16	Heart aliments	9	3	0.75
17	Other general	45	9	0.81
	Total	**1200**	**201**	

Table 3. Most frequently used plants for different ailment categories based on highest FL (%) in each ailment category (Total informants = 50).

No.	Botanical name	Ailment categories	Citation for particular disease (use report)	Fidelity level (%)
1	*Stachytarphet ajamaicensis* (L.)Vahl	Antidote	46	92
2	*Eclipta prostrate*(L.) L.	Menstrual disorder	45	90
3	*Euphorbia tithymaloides* L.	Wound	44	88
4	*Curcuma longa* (L.)	Diarrhea	42	84
5	*Ageratum conyziodes* (L.) L.	Cough	42	84
6	*Barleria cristata* L.	Dizzy	40	80
7	*Peperomia pellucida* (L.)	Cataract	37	74
8	*Dregea volubilis* (L.f.) Benth. ex Hook. f	Arthritis	37	74
9	*Andrographis paniculata* Nees.	Diabetes	36	72
10	*Vitex trifolia* L.	Fever	34	68
11	*Chromolaena odorata* (L.) R.M. King. H. Rob.	Wound	33	66
12	*Piper nigrum* L.	Fever	32	64
13	*Tadehagi triquetrum* (L.) H. Ohashi	Antiseptic	30	60
14	*Clerodendrum indicum* (L.) Kuntz	Carminative	30	60
15	*Phyllanthus chamaepeuce* Ridl.	Diuretic	29	58
16	*Sauropus androgynous* (L.) Merr.	Diuretic	25	50

the threat of slowly vanishing of the knowledge [18]. However, the plant species having high UV should be further screened in ethnopharmacological studies for active compounds [19].

3.3 Informant consensus factor (ICF)

The Informant Consensus Factor ICF values ranges from as low as 0.74 to as high as 1 in the present findings (Table 2). The results of this study showed that the highest ICF value (1) is for the diseases of the eye ailment (eye pain). It is recorded that only one species, *Chromolaena odorata* (L.) was cited to treat the eye pain by the informants. The reasons were the greater consensus on the use of a given plants to treat a particular aliment category, the availability of this medicinal plants from wild habitats nearby and inheriting traditional medicinal knowledge for eye pain from their ancestors. In India the leaf is used to treat dysentery; also applied on fresh cuts and wounds to stop bleeding [13].An aqueous ethanol extract of the leaves of *C.odorata* were found to have antifungal activity [20]. The next highest ICF value (0.95) *Oroxylum indicum* (L.) was for the disease category for tinnitus in this study. One reported revealed that the leaf juice of *O. indicum* was used as a remedy for opium toxicity. Leaves are also boiled and eaten to stimulate bowel movements. In the Philippines the juice from the crushed bark is rubbed on the back to relieve the ache accompanying malaria [20]. *Clerodendrum indicum* L. was the most commonly used plant species for earache disease category. However, the decoction of all parts of plants consumed orally for body swollen and urinary diseases [17].

Higher the value of ICF (close to 1) means that the higher the degree of agreement between the informants and the selected taxa to be used in treatment within a category of ailments while low ICF represents disagreement among the informants [21]. High ICF values also indicated that the species are traditionally used to treat these ailments which are worth searching for bioactive compounds. The low ICF value as recorded in this study did not mean that the plant species has no worth value and it could be due to a lack of communication among people in the study areas.

3.4 Fidelity level (FL)

From the results, the highest FL values were observed in *Stachytarpheta jamaicensis* (L.) Vahl (92%) used in antidote and *Eclipta prostrata* (L.) L. (90%) used in menstrual disorder. *Sauropus androgynous* (L.) Merr. was the plant with the lowest FL value (50%) which used to treat diuretic (Table 3). Plants that have higher number of FL value are considered to be the model plants that can be employed in further ethno-pharmacological research [22]. Among

16 species, most species contain flavonoids, tannins, saponins, steroids, alkaloids and glycosides. But the major bioactive components in *Sauropus androgynous* (L.) Merr. are the fatty acids, flavonoids, and polyphenols [23]. However, *Stachytarpheta jamaicensis* (L.) Vahl have therapeutic properties.

4. Conclusion

Myanmar has rich in plant diversity. The present study showed that traditional treatment systems using medicinal plants is still prevalent in the studied areas. The analyzed data may provide opportunities for extraction of new bioactive constituents and to develop herbal remedies. The study also confirmed that the communities residing in the area have not struggled for conservation of this traditional treasure of indigenous knowledge and medicinal plants. Therefore, conservation strategies should be adopted for the protection of medicinal plants and traditional knowledge in the study area to sustain them in the future.

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