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Study of Ethno-Medicinal plants used by the Mishing People of Dhemaji District of Assam, India

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Research Article

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Abstract

A survey of Ethno-Medicinal plants used by the Mishing people was conducted from June 15, 2015 to February, 2016 in the Mishing populated areas of Dhemaji district of Assam. The survey aimed at identifying the plants used in the general pharmacopoeia among the Mishing communities also using interviews with house wives and mothers who have a rich knowledge on the plants. A total of 40 medicinal plants were recorded from 50 households. Amoebic dysentery, Abscess, Boils, Cough, Conjunctivitis, Diabetes, Epilepsi, Flatulence, Fracture, Gum bleeding, Galactagogue, Gonorrhoea, Headache, Helminthiasis, High blood pressure, Indigestion, Jaundice, Lower back pain, Malaria, Manstrual disorder, Tooth decay, Tuberculosis, Uterine disorder etc. were the major ailments treated in these households. To compare the usages of the plant species an index of performance (Ip) was calculated for each plant species, from the number of citations of treatment actually recorded from the households against proportion of each plant among the general flora. Some plants are widely used by other communities also in similar ways. The plants with high (Ip) are often confirmed to possess effective medicinal substances in the literature.

Keywords: Ethno-Medicinal Plants; Dhemaji; Mishing; Pharmacopoeia; Performance Index

Introduction

Background of the Study

Ethno botany is defined as the study of local people's interaction with the natural environment: how they classify, manage and use plants available around them. Over centuries, indigenous people have developed their own locality specific knowledge on plant use, management and conservation. The complex knowledge, beliefs and practices generally known as indigenous knowledge or traditional knowledge develops and changes with time and space, with change of resources and culture. To view this ethnobotanical studies are useful in documenting, analyzing and disseminating knowledge and interaction between biodiversity and human society, how diversity in nature is used and influenced by human activities. Local communities have

indigenous experience in categorizations, where they use their perceptions and experiences to categorize plants. From their experience, a number of categorization and classification criteria were developed which is important in plant diversity conservation and management. India is one of the 12th mega biodiversity countries in the world having two hotspots – the Western Ghats and the Eastern Himalayas, based on species rarity and endemism [1,2]. Arunachal Pradesh (83,743 sq km) occupies a major portion of the Indian Eastern Himalaya-global biodiversity hotspot and the state alone has recorded 5000 species of angiosperms, of which over 500 species of medicinal plants are reported from the state [3-5].

In Dhemaji, though there has been some organized ethno-medicinal studies, there is limited development of therapeutic products and the indigenous knowledge on usage of medicinal plants as folk remedies are getting lost owing to migration from rural to urban areas, industrialization, rapid loss of natural habitats and changes in life style. In Dhemaji, traditional medicine is faced with a problem of sustainability and continuity mainly due to the loss of taxa of medicinal plants. In view of these, documentation of the traditional uses of medicinal plants is an urgent matter and important to preserve the knowledge. The current loss of medicinal plants in the Dhemaji district is due to natural disaster like flood and erosion and anthropogenic factors linked with the loss of valuable indigenous knowledge associated with the plants. Hence, there exists an accelerated devastation of plant resources with loss of indigenous knowledge. The lack of conservation actions and activities is observed in Dhemaji district, as is the case in many other areas in Assam. Even though Dhemaji is known to have a relatively better plant resource and hence, the associated traditional knowledge resource is expected to be significant. The current plant use trend shows that the environment is facing problems of resource depletion and loss of indigenous knowledge like other areas of the country. Thus, concerted ethno botanical research plays a vital role to draw information on plants associated with indigenous knowledge for conservation and sustainable utilization. In addition, right from its beginning, the documentation of traditional knowledge, especially on the medicinal uses of plants, has provided many important drugs of modern day. Among rural communities in Dhemaji district traditional medication is believed to be an important healthcare system, which mainly involves the use of locally available medicinal plants. Some studies were done on some localities of Assam but no study was done to include medicinal plants and indigenous knowledge of the local communities of Dhemaji district in the medicinal records of Assam. This study is believed to add up to the country database of medicinal plants and in documenting local knowledge of the people. This study has been initiated to conduct ethno botanical study of medicinal plants in Dhemaji district and to compile and document indigenous plant based medical knowledge of the people.

World Health Organization (2003) estimated that 80% of the world's population depends on traditional medicine for their health needs. In many developed countries, traditional herbal remedies are making a comeback as alternatives to modern medicine. The existence of traditional medicine depends on plant diversity and the related knowledge of their use as herbal medicine. India is one of the twelve mega biodiversity hot spot regions of the world and one fifth of all plants found in India are used for medicinal purpose [6]. Nearly 25,000 effective plant based formulations are used in folk medicine by rural communities in India.

Ethno botanical research on medicinal plants is getting much importance and it is included among the advanced research in India during the recent years. Plants have much relevance on Socio-economic, Socio-religious aspects of human life in India. Central India is covered with tropical forests, which are supposed to be rich in biodiversity. However subtropical hill forests are found in few areas. About 500 species of medicinal plants are found in the north eastern region of India. Some of the economically medicinal plants are on the verge of extinction. The endemic and rare flora also found in this region. Dhemaji district situated in the north east corner of India occupies an area of 3,217 square kilometers. It is one of the remotest district of India, at the eastern-most part of Assam. Situated in the foothills of the lower Himalayas it is relatively a small district. Being in a confluence of rivers with the mighty Brahmaputra River flanking the district and its numerous tributaries running through the district, the region is perennially affected by floods. According to the 2011 census Dhemaji district has a population of 688,077. (Source: Dhemaji District Information and Public Relation Officer, Government of Assam)

Study Area

Botanically the forest of Dhemaji and Lakhimpur districts can be divided into three divisions viz. Mixed, deciduous and mixed deciduous. The forest in the district is either deciduous or mixed evergreen seen scattered in the foothill areas. The forest resources are timber,

bamboo and cane with swamps covered with grass and reeds. There are 9 reserved forests namely Subansiri, Jiadhal, Sissi, Simen, Archiac, Jamjing, Senga, Gali and Pova covering an area of 53, 224.11 hectares which is worked out to be just 16% of the total area of the district. As the major part of the Study Area Dhemaji is located near the foothills of Arunachal Pradesh, it exhibits difference in temperature, rainfall, fog, wind etc. The climate of the district is Per-humid characterized by high rainfall. The annual rainfall of the district ranges from 2600 mm to 3200 mm. Rainfall generally begins from April and continues till the end of September. July is the rainiest month. The relative humidity varies from 90 to 73 per cent. The temperature varies between 39.9°C in summer and 5.9°C in winter. Three highly Mishing populated areas like Jonai, Sissikalghar and Dhemaji were selected for this study.

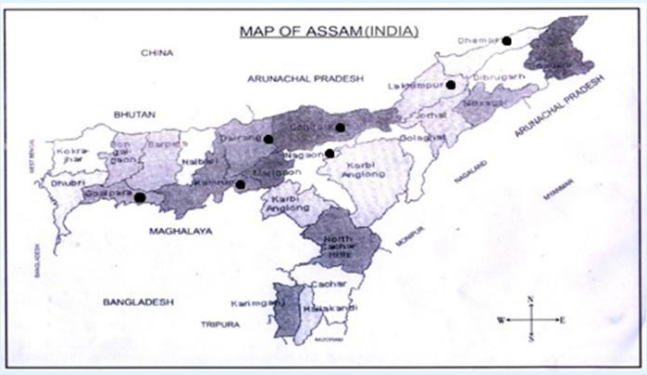

Figure 1: Map of Assam.

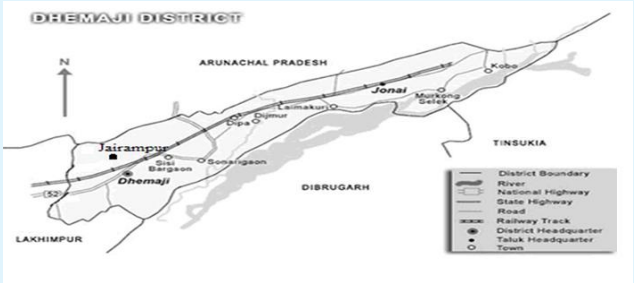

Figure 2: Map of Dhemaji district of Assam.

The major ethnic groups of Dhemaji district are Sonowal Kachari, Lalung, Mishing, Bodo, Deuri, Hajong etc. and they live side by side in and outside the reserve forests and in the bank of the river Brahmaputra. These tribes are designated as the Scheduled Tribes (ST) by the constitution of India. These people depend directly or indirectly on the forest resources and agriculture.

About the Mishing Community Undertaken for this Study

Assam is a land of various tribes and communities located over the entire span of the state. These tribes bear huge cultural and linguistic differences and at the same time similarities too. One of the prominent tribes in the upper Assam is the Mishing tribe. Mishing community an indigenous tribe of Dhemaji district of Assam has been using medicinal plants through many generations of age old, time-tested practices, and as a consequent accumulation of knowledge through a series of observations, interactions and innovations. Mishing (or formerly Miris) tribe comprises of ethnic people inhabiting mainly the Dhemaji, North Lakhimpur, Tinsukhia, Dibrugarh, Sibsagar, Jorhat and Golaghat districts of Assam. Also many of the tribes settled in various districts of Arunachal Pradesh. Although the exact origin of the Mishing people hasn't been confirmed, but it is believed that these people are originally from the hills of Arunachal Pradesh and have lots of cultural and linguistic similarities with the Adi tribe of Arunachal Pradesh. It may be possible that these people migrated towards south in search of a fertile land and settled on the bank of the river. But due to recurring flood of the Brahmaputra River and its tributaries the Mishing people started moving to different safe places of Assam. The Mishing belong to a mixture of East Asian as well as Southeast Asian sub race of the Mongoloid race, similar to the mixture of the Mongoloid sub-races inside political China as people from Southern China may look more like the South East Asian brown-skinned Mongoloids and more towards the Northern China more fair skinned Mongoloids dwell. It's not known exactly where they migrated from, but it is popularly believed that they were dwellers of the hills of present day Arunachal Pradesh. There is no written history of Mishing about their migration from hills to the plains of Assam. Though they belong to Tani group of tribes and they used to be hill dwellers, they started living on the banks of rivers in plains of Assam.

Mishing live in thatched houses raised on bamboo stilts. This is called a 'Chaang ghar' (Figure 3) which means house on stilts. Under the raised structure they keep their domestic animals .This 'Chaang ghar' helps to protect themselves from flood as they basically live in flood prone areas. They basically depend upon agriculture, and that is why they chose to live at the fertile

river bank area. The Mishing women are born artists, which reflect in their designs of clothes. They wear clothes that they weave themselves which very beautifully designed. Their food habits are also quite different from other tribes of Assam. The chief festival of Mishing is Ali-Aye-Ligang which they celebrate during the month of February at the beginning of their sowing season. This is actually worship to their god. They follow 'Donyi Polo' as their God and offer lots of food along with living animals to Him. But now days they also follow Hinduism. Some also follow Christianity. Because of the repeated flood they are affected economically. But they still live in the banks of the Brahmaputra River and continue their unique cultural identity.

Figure 3: A Mishing medicine man coming out from his house (Chang ghar).

Materials and Methods

Survey and Selection of Site

In order to document the knowledge of traditional medicine used by the indigenous Mishing tribes of Dhemaji district of Assam a survey of study area was conducted from June 15, 2015 to February, 2016. Three highly Mishing populated areas like Jonai, Sissikalghar and Dhemaji were selected for the study. A questionnaire was used at the time of interview. The questionnaire included local name of the plant, parts used, mode of use, ailments etc. During the survey two interviewing methods were followed. The first was the 'specimen display' method. Plant species were shown to the traditional healers. The same plant was shown to different healers of the district to confirm the accuracy of the results. The second interviewing method was to walk through the forest with the healers for both plant identification and detailed information gathering.

Sampling Informants

The informants interviewed numbered 285 (176 men, 109 women) whose ages ranged from 30 to 85 (average age= 57-58) and who mainly belonged to families which had strong links with traditional activities of the area. The informants were purposively selected based on recommendation from elders and local authorities or Village heads (Gams/Gaon buras). They were interviewed in local language. The 153 interviewees were aged over 45; 132 informants were aged under 45, and one interviewee was aged about 85. 20 female informants and 70 male informants studied up to Class VI to Class VIII level and the rest were illiterate. In recording the information of diseases, although enough care was taken to translate this into medical terms, but many information were put 'as it is' at many places to refer exactly whatever was reported, so as to avoid the information being in any way fallacious. All collections were made by the first author who could speak local language and also familiar with some of the traditional plants used by the local tribal people of the region. Herbalists were interviewed using a semi-structured questionnaire. The second author accompanied in field visit and helped in the analysis of the data and photography. A total of 20 field visits (3–4 days in each survey) were conducted during the study period. The questionnaire was mainly focused to collect local names of the plants, plant parts used, method of preparation and associations with other plants, and how such knowledge is preserved and transmitted to next generation. With the help of local informants, the plant material was collected and dried following the standard herbarium procedures [7]. The taxonomic identification of some collected plant specimens was also made with the help of herbarium materials of Botanical Survey of India, Shillong. The voucher specimens were deposited in the Department of Botany, Dhemaji College, Assam for future reference.

Data Analysis

Informant Consensus Factor (ICF)

In order to evaluate the reliability of information during the interview, informants were contacted at least two times for the same ideas and the validity of the information was proved and recorded. Consequently, if the idea of the informant deviates from the original information, it was rejected since it is considered as unreliable. Only the relevant ones were statistically

analyzed. This method was adopted from Alexiades [8]. The medicinal plant uses were classified into categories following the standard developed by Heinrich, et al. [9]. To test homogeneity of knowledge on the use of plants in the illness categories between the populations, the ICF method was applied. The ICF is calculated for each category to identify the agreements of the informants on the reported cures for the group of ailments. The ICF were calculated as follows:

$$ICF = \frac{nuc - ns}{nuc - 1}$$

where

nuc = number of use citations in each category

ns = number of species used for each citation

The factor provides a range of 0 to 1, where a high value acts as a good indicator for a high rate of informant consensus. As for example in case of Malaria disease the ICF is determined as follows. Here nuc = 12 and ns = 5

$$ICF = \frac{nuc - ns}{nuc - 1}$$

$$= \frac{12-5}{12-1}$$

$$= 0.64$$

The factor provides a range of 0 to 1, where a high value acts as a good indicator for a high rate of informant consensus.

Level of Fidelity (Fl)

Moreover, the level of fidelity (Fl) of Friedman, et al. [10] is computed to determine the most preferred species used in treatment of particular ailment as many plant species may be used in the same use category:

$$\text{Fl (\%)} = \frac{SF}{TF} 100$$

where

SF = Frequency of citations of a species for a specific ailments.

TF = Total number of citations of that species.

As for example, in case of Acacia fermensiana Linn. for treating ailment malaria the Fl is determined as follows

SF= 3

TF= 10

$$\text{Therefore Fl} = \frac{3}{10} \times 100 = 30.$$

40 different human ailments were treated by the traditional healers using various medicinal plant species. The degree of consensus in terms of ICF was observed among the traditional healers in treating the diseases (Table 1).

Performance Index of Medicinal Plants

Performance Index is proposed by Betti [11,12]. For analyzing the data, "specific flora" is defined as the list of the plants used for treating a specific ailment. The 'global flora' is defined as the total list of plants recorded to be used for all types of ailments. The relationship between the 'specific flora' and 'global flora' can be inferred as follows. If the use of a specific plant for a specific ailment is randomly selected, the proportion of the number of citations to the total number of citations (P_1) would be similar to the proportion of specific flora to the global flora (P_2). To illustrate the selectivity of a plant for a specific ailment a comparison is made here between the expected and observed values of the proportion of citation of a plant for a specific disease. The difference (D) between the two proportions is then used to define a Performance Index (IP), which ranges from 0 to 3 according to the following arbitrary scale –

(i) If $P_1 - P_2 < 0$, IP = 0, the plants concerned are rejected, not significant.

(ii) If $0 < P_1 - P_2 < {}^1/_3$, IP = 1, average performance.

(iii) If ${}^1/_3 < P_1 - P_2 < {}^2/_3$, IP = 2, high performance.

(iv) If $P_1 - P_2 > {}^2/_3$, IP = 3, very high performance.

To illustrate this, an example is given for the performance index of plant, Acacia fermesiana Linn. used for treating mal., Him, ctv.

Ailments: Malaria

- **Acacia fermesiana Linn**

C_1 = No of citations of A …….. for treating Mal. = 3

C_2 = No of citation of A …….. inter global list = 10

C_3 = total no. of citations of the Mal. = 12

C_4 = total no. of citations for all ailments =335

The proportion of the no. of citations to the total no. of citations

$$P_1 = \frac{C_1}{C_2}$$

$$= \frac{3}{10}$$

$$= 0.3$$

The proportion of specific flora to the global flora,

$$P_2 = \frac{C_3}{C_4}$$

$$= \frac{12}{335}$$

$$= 0.04$$

Difference between the two proportions

$$D = P_1 - P_2$$

$$= 0.26$$

$$\therefore 0 < P_1 - P_2 \leq = \frac{1}{3}$$

Hence performance Index (IP) = 0.26, average performance.

Results and Discussion

Ailments	Scientific name of the plant	Pl part	Pharm	Adm	Noc
Group:	**Cardiovascular disorder**				
Hbp	Clerodendrum colebrookianum Walp. Ln: Pakkom	lf	de	or	5
Hbp	Rauvolfia serpentina (L.) Benth.ex Kurz. Ln: Sarpagandha	rt	in	or	3
Hbp	Urena lobeta L. Ln: Bor sonborial	lrt	de	or	3
Hbp	Elaeocarpus sphaericus (Gaertn)K. Schum Ln: Rudraksha	sd	de	or	2
Hbp	Terminalia arjuna Ln: Arjun	bk	de	or	3
Hbp	Allium sativum L. Ln: Rasun	cl	ch	or	2
Ht Bn	Phyllanthus emblica L Ln: Amloki	ft	in	or	1
Ht.Bn	Tinospora cordifoloa Miers Ln:Amorlota	if	de	or	1
Ht.Bn	Meyna spinosa (Roxb.)ex. Link Ln: Kotkura	fr	de	or	1
Ht Bn	Elephantopus scaber L. Ln: Bon tamaku	rt	in	or	1
Group:	**Digestive system disorder**				
Amd,	Aegle marmelos (L.) Corr Ln: Bel	ft	plp	or	17
Amd	Centella asiatica (L.) Urban Ln: Manimuni	lf	in	or	16
Amd	Mangifera indica L. Ln: Am; Ke:di	bk	de	or	13
Dir	Clerodendrum indiccum (L.) Kuntze Ln: Akalbih	ft	plp	or	10
Dir	Ficus racemosa L. Ln: Tajig	tl	de	or	15
Dir	Acacia catechu (L)Willd Ln: Khoir	bk	de	or	12
Clr	Aloe vera (L.) Burm. Ln: Chalkuwari	lf	in	or	13
Ind	Oldenlandia corymbosa L Ln: Bonjaluk	wp	in	or	11
Ind.	Carica papaya Linn.. Ln: Ombita	ft	de	or	11
Flt	Capsicum frutescence L. Ln: Lukuni murchi	ft	de	or	13
Group:	**Dental problem**				
Tac	Achyranthe aspera L Ln: Hakota bon	st	ms	bt	4
Tac	Calotropis procera Br. Ln: Ako ata esing	rt	as	la	3
Tac	Solanum khasianum Clarke Ln: Bangko	sd	sm	or	5
Tac	Spilanthes paniculata L. Ln: Morsang	fl	in	gl	3
Tac	Zanthoxylam nitidum (Roxb.) DC Ln: Onger	rt.bk	ms	bt	5
Gbl	Blumea lacera DC. Ln: Barbie	lf	in	la	4
Gbl	Zanthoxylam nitidum (Roxb.) DC Ln: Onger	rt.bk	de	or	6
Gbl	Leucas plukenetii (Roth) Spreng Ln: Boga Doron	lf	ju	la	5
Gbl	Nicotiana tabacum L Ln: Tambaku	lf	ju	la	4
Gbl	Azadirachta indica A.Jussieu Ln: Nim	lf	Ju	la	5
Group:	**Gynaecology**				
Glg	Alternanthera sessilis (L.) R.Br.ex DC Ln: Jig jalapa	wp	de	or	4
Glg	Curculigo orchioides Gaertn Ln: Nagini	rt	in	or	4
Glg	Plantago erosa Wallich Ln: Singa	wp	in	or	4
Glg	Musa paradisiaca L Ln: Kopak	fl	de	or	4

Glg	Polygonum chinensis Linn Ln: Bihlongi	lf	in	or	7
Glg	Trachelospermum fragrans Hook.f . Ln: Lota bagini	bk	de	or	7
Glg	Amaranthus spinosus L. Ln: Hati Khutura	lf	de	or	4
Glg	Euphorbia pulcherrima Willdenow ex Klotzsh Ln: Lalpata	ltx	in	or	3
Mnd	Spondias pinnata (Linn.f.) Kurz. Ln: Amora	rt	in	or	2
Mnd,	Cyperus rotundus L v Ln: Mutha bon	rt	de	or	2
Mnd	Butea monosperma (Lam.)Taubst. Ln: Polas	bk	de	or	3
Mnd	Artemissia indica Willd Ln: Tapin	lf	in	or	2
Group:	**Genital problem**				
Gnh	Houttuynia cordata Thunb Ln: Mosundori	lf	de	or	2
Gnh	Curculigo orchioides Gaer. Ln: Nagini	rt	in	or	1
Urp	Fleurya interrupta Gaudich Ln: Peji	rt	de	or	2
Urp	Xanthium strumarium Linn Ln: Tanggom	rt	de	or	2
Utd	Polygonum hydropiperL Ln: Pathrua Bilogoni	wp	in	or	1
Utd	Asparagus racemosus Willd Ln: Hotmul	rt	in	or	1
Group:	**Musculo skeletal system**				
Lbp	Seleginella spp. P.Beauv Ln: Mane okang	wp	in	or	1
Lps	Calotropis procera Br. Ln: Ako ata esing	Rt.bk	de	la	1
Frc	Cissus Quadrangular L Ln: Herhurua lata; Along gv:sut	st	in	la	1
Rat	Alpinia galangal (L.) Willd Ln: Karphul; Gandhi	rt	in	la	2
Rat	Sida rhombifolia L. Ln: Sunalika	st	de	or	1
Group:	**Parasitic disease**				
Mal	Acacia fermesiana Linn. Ln: Kodombor	St.bk	de	or	8
Mal	Alstonia scholaris (L.) R. Br Ln: Chatiyana	st.bk	de	or	7
Mal	Gomphostemma parviflora Wall Ln: Bhedaitita	lf	de	or	9
Mal	Solonum torvum Lin. Ln: Sita- bangko	rt	in	or	6
Mal	Xanthium strumarium Linn Ln: Tanggom	rt	de	or	8
Hlm	Acorus calamus L. Ln: Alokoni; Bosh	rt	de	or	7
Hlm	Adhatoda vasica Nees Ln: Kampon Baok	lf	in	or	8
Hlm	Carica papaya Linn.. Ln: Ombita	sd	de	or	6
Hlm	Solonum indicum Lin Ln: Bangko	ft	in	or	4
Group:	**Skin disease**				
Scb	Cassia alata L. Ln: Kharpat	lf	in	la	14
Scb	Gomphostemma parviflora Wall Ln: Bhedaitita	lf	pt	la	12
Rnw	Acorus calamus L Ln: Alokoni, Bosh	rt	pt	la	13
Rnw	Aloe vera (L.) Burm Ln: Chalkuwari	lf	pt	la	9
Rnw	Gomphostemma parviflora Wall Ln: Bhedaitita	lf	pt	la	14
Rnw	Mirabilis jalapa Linn Ln: Donyi appun	lf	pt	la	10
Sir	Aloe vera (L.) Burm Ln: Chalkuwari	lf	in	la	12
Bls	Mirabilis jalapa Linn Ln: Donyi appun	lf	pt	la	11
Group:	**Respiratory problem**				
Cgh,,	Achyranthes aspera L. Ln: Hakota bon	wp	de	or	8
Cgh	Acorus calamus L Ln: Alokoni, Bosh	rt	de	or	6
Cgh	Caesalpinia bonduc (L.) Roxb Ln: Letaguti	sd	de	or	8
Cgh	Clerodendrum indicum (L) Kuntz. Ln:Akalbih	rt	de	or	7
Ast	Adhatoda vasica Nees Ln: Kampon Baok	lf	in	or	8
Brn	Alpinia galanga (L.) Willd Ln: Karphul; Gandhi	rt	in	la	7
TB	Asparagus racemosus Willd Ln: Hotmul	rt	de	or	6
TB	Sida rhombifolia Linn Ln:Sunalika	st	de	or	7

Group:	Nervous system problem				
Hys	Passiflora foetida L. Ln: Nakung	lf	de	or	1
Epl	Rauvolfia serpentina (L.) Benth.ex Kurz. Ln: Sarpagandha	rt	in	or	2
Epl	Vitex.nigundo Linn Ln: Posotia	fl	in	or	2
Epi	Asparagus racemosus Willd Ln: Hotmul	rt	in	or	1
Hpb	Urena lobata L.	rt	de	1or	1
Group:	**Specific conditions**				
Cwb	Adhatoda vasica Nees Ln: Kampon Baok	lf	ju	la	7
Cwb	Ageratum conyzoides L Ln: Namying eing	lf	in	la	9
Got	Alpinia allughas (Retz.) Rosc Ln: Talayang akhan, Tora	rt	in	la	6
Pls.	Butea monosperma (Lam.) Taub. Ln: Polas	st.bk	de	or	8
Pls	Desmodium viridiflorum(L.) DC Ln: Bioni sabota	rt	pd	la	9
Jnd	Polygonum glabrum Willd Ln: Bihlongi	rt	in	or	8
Dbt	Dillenia indica Lin. Ln: Sompa	Ft	in	or	10
Dbt	Scorpia dulcis Linn. Ln: Digie sampek	lf	in	or	8
Dbt	Tinospora cordifolia (Willd.) Hk.f. & Thoms Ln: Hagunilota	st	in	or	10
Hdc	Drymaria cordata Willd Ln: Porrok tapen	wp	pt	la	5
Hdc	Passiflora foetida L. Ln: Nakung	lf	de	or	6
Fvr	Gomphostemma parviflora Wall Ln: Bhedaitita	lf	de	or	9
Group:	**Animal bite**				
Snb	Achyranthes aspera L Ln: Hakota bon	rt	pt	la	2
Snb	Rauvolfia serpentina (L.) Benth.ex Kurz. Ln: Sarpagandha	rt	ju	la	2
Inb	Alocasia indica (Roxb.) Schott Ln: Ange	lf	ju	la	1
Inb	Aloe vera (L.) Burm. Ln: Chalkuwari	lf	ju	la	1
Inb	Nicotiana tabacum L Ln: Tambaku	lf	ju	la	1
Inb	Carica papaya Linn Ln: Ombita	lf	ltx	la	1
Inb	Clerodendrum viscosum Vent Ln:Dhopat tita	lf	ju	la	1
Ob	Murraya koenigii (L.) Sprengel Ln: Narhing	bk	pt	la	1
Ob	Ocimum basilicum L. Ln:Bon tuloki	lf	pt	la	2
Ob	Urtica dioica L Ln: Sorat	rt	pt	la	1
Group:	**Eye problems**				
Ctv	Acacia fermesiana Linn Ln: Kodombor	lf	de	la	1
Ctv	Aloe vera (L.) Burm. Ln: Chalkuwari	lf	ju	la	1
Ctv	Butea monosperma (Lam.) Taub. Ln: Polas	fl	in	la	2
Ctv	Euphorbia hirta L Ln: Gakhirati bon	lf	ju	la	1
Ctv	Mangifera indica L. Ln: Am; Ke:di	bk	de	la	2
Ctv	Artemisia indica Will. Ln: Tapin	Lf	in	la	1
Ctv	Clerodendrum viscosum Vent Ln:Dhopat tita	lf	in	la	1
Ctv	Oxalis corniculata L. Ln: Tengesi	lf	in	la	1
Ctv	Tamarindas indica L. Ln: Teteli	lf	de	la	1

Table 1: Citations of Medicinal plants among the Mishing community of Dhemaji district of Assam [Abreviations used : Number of citations= Noc; Local names=Ln].

Ailments: Amoebic dysentery (Amd); Asthma (Ast); Boils (Bls); Bronchites (Brn); Cough (Cgh); Cut wound bleeding (Cwb); Conjunctivitis (Ctv); Cholera (Clr); Diabetes (Dbt); Diarrhoea (Dir); Epilepsi (Epl); Flatulence (Flt); Fracture (Frc); Fever=Fvr; Gum bleeding (Gbl); Galactagogue (Glg); Gout (Got); Gonorrhoea (Gnh); Hydrophobia (Hpb) Headache Hdc); Hysteria (Hys); Helminthiasis (Hlm); High blood pressure (Hbp); Heart burn=Ht.bn, Indigestion (Ind); Snake bite (Snb); Insect bite (Inb); Other bite (Obt) ;Jaundice (Jnd); Lower back pain (Lbp); Leprosy (Lps); Malaria (Mal); Manstrual disorder (Mnd); Piles (Pls); Rheumatoid arthritis (Rat); Scabies (Scb); Ring worm (Rnw); Skin irritation (Sir) ; Toothache (Tac);

Tuberculosis (TB); Urinary problem (Urp); Uterine disorder (Utd)

Plant part (Pl.part): = stem bark = st.bk ; Leaf= lf; Root= rt; fruit=ft; Flower=fl; Seed =sd;

Pharmaceutical form (Pharm): = decoction= de; infusion=in; Pulp=Plp; Pound=pd; Masticate= Ma; Juice= ju; Ash=as; Seed smoke=sm; Paste=pt; Masticate=ms]
Mode of Administration (Adm): oral=or, Local application=la, Gargle= gl; Brush teeth= bt]

Group of ailments	Ailments	Noc	Total
Cardio Vascular Disease	High blood pressure	18	
	Heart burn	4	22
Digestive system disorder	Amoebic dysentery	46	
	Diarrhoea	37	
	Flatulence	13	
	Indigestion	22	
	Cholera	13	131
Dental problem	Toothache	20	
	Gum bleeding	24	44
Gynaecology	Lactation failure	37	
	Manstrual disorder	9	46
Genital problem	Urinary problem	4	
	Gonorrhoea	3	
	Uterine disorder	2	9
Musculo skeletal system	Lower back pain	2	
	Rheumatoid arthritis	3	
	Fracture	1	6
Parasitic disease	Malaria	38	
	Helminthiasis	25	63
Skin disease	Scabies	26	
	Ring worm	46	
	Skin irritation	12	
	Boils	11	95
Respiratory problem	Bronchites	7	
	Cough	29	
	Tuberculosis	13	
	Asthma	8	57
Nervous system problem	Epilepsi	5	
	Hysteria	1	
	Hydrophobia	1	7
Specific condition	Piles	17	
	Gout	6	
	Fever	9	
	Cut wound bleeding	16	
	Headache	11	
	Diabetes	28	
	Jaundice	8	95
Animal bite	Snake	4	
	Insect	9	13
Eye problem	Conjunctivitis	11	11

Table 2: Group of ailments, Ailments and number of citations recorded during interview with the Mishing people of Dhemaji district.

40 different diseases under 13 groups of ailments were recorded as human health problem that are treated by 76 plant species (Table 2), one species can treat a single disease or a number of diseases. The practitioners of the area commonly diagnose each health problem by an interview and visual inspection of the patient. These shows large numbers of diseases have got solution by traditional medicine in Dhemaji district. According to the informants the largest number of species was used to treat Gynecological problems and some diseases under Specific conditions which are treated with 12 species each. Digestive system disorder like Amoebic dysentery, Diarrhea, Flatulence, Indigestion, Cholera etc is common disease in the area because most people drink unhygienic water collected from ponds or streams so the people are very much susceptible to different types of water born diseases; the next is skin diseases which are treated by 8 species. Skin diseases like Scabies, Ringworm, Skin irritation, Boils etc are also very common in the study areas due to the unhygienic style of living. Another very common problem found among the Mishing people is Malaria and Helminthiasis. Dhemaji district is a Malaria prone district but the Mishing people seldom use the mosquito nets. Besides they also frequently suffer from Helminthiasis particularly from round and tape worms. This is due to the filthy surroundings caused by the domestic animals like pigs, hens, cows etc. The practitioners were also visited more for diseases like tooth ache, gum pain, lactation failure menstrual disorder, animal bite, urinary problem and others. The local community prefers traditional healers for such diseases rather than modern medication.

Group of ailments	Species	Use of citations	ICF
Cardio Vascular Disease (CVD)	10	22	0.571
Digestive system disorder (DSD)	10	131	0.93
Dental problem	10	44	0.79
Gynaecology	12	46	0.755
Genital problem	6	9	0.375
Musculo skeletal system	5	6	0.2
Parasitic disease	9	63	0.87
Skin disease	8	95	0.925
Respiratory problem	8	57	0.875
Nervous system	5	7	0.333
Specific condition	12	95	0.882
Animal bite	10	13	0.25
Eye problem, Ear problem, Nose smell, Mouth smell	9	11	0.2

Table 3: Informant consensus factor by categories of diseases in the study area [ICF= Informant Consensus Factor].

As the Table 3 shows the Digestive system disorder (DSD) and Skin disease each have scored the highest informant consensus factor of 0.930 and 0.925 followed by Specific condition, Parasitic disease, Dental problem, Gynecology each have scored an informant consensus factor of 0.882, 0.870, 0.790,0.755 respectively. A high ICF value (close to 1) indicates that the informants use relatively few taxa to manage specific disease conditions as well as consistency in the use of plant species, while a low value indicates that the informants disagree on the taxa to be used in the treatment within a category of illness. The lower informant consensus factor (0.200) in this study scored for the category of diseases like eye, ear, nose and mouth problems. This category may be indicative for lack of consistency in the use of plant species in the study area.

Threat and Conservation Practices to Medicinal Plants

In Dhemaji district from the interview of informants, various factors were recorded as the main threats for medicinal plants in the area. There is loss of plants as a result of agricultural encroachment, firewood, charcoal, timber, construction material are contributing factors for the loss of plant species in general and medicinal plants in particular. According to the traditional healers, nowadays searching of medicinal plants require long time and moving long distance even going to neighboring districts of Assam and Arunachal Pradesh to collect the plants. Even some healers have started to grow some medicinal plants in in their home garden as a result of scarcity of plants in the wild. Some of the traditional healers might have given much attention to the indigenous knowledge

transfer while others have little concern regarding the value of indigenous knowledge. In general, the knowledge on medicinal plants become lesser and lesser due to its secrecy (unwilling to give this knowledge to others with a belief that if they do so the medicine will not work and their reputation will be bad), unwillingness of young generation to gain the knowledge, oral based knowledge transfer, unavailability of the species, influence of urbanization, modern education and awareness factors which all results in gradual loss of indigenous knowledge on medicinal plants in the area. A remarkable traditional medicinal plant knowledge and practice was documented from the study area. Older traditional healers had greater knowledge and use of ethno-medicinal plant species than younger traditional healers. The average age of the traditional healers was 57.92 years. The fact that 70.83% of the healers were aged above 50 years implies that the legacy of the use of traditional medicines to manage diseases is in danger of being permanently lost if quick efforts are not exerted to document this invaluable knowledge. As a result, the community suffered an important erosion of ethno-medicinal plant knowledge. It is a fact that as traditional healers who value traditional knowledge are becoming very old, the indigenous medicinal plants use knowledge was declining among the younger generation, which could be attributed to the low interest of the younger generation to inherit and use ethno-medicinal knowledge.

Ethno-medicinal knowledge diminishes with the death of elderly knowledgeable persons. A key informant from one of the study areas with an age of 70 said "I wanted to tell my knowledge of medicinal plants to my sons but they are not interested now I fear this knowledge will be permanently lost at the time when I die." This saying indicates that there is poor ways of transferring knowledge on medicinal plants. Depending on the age of the healers passing the knowledge of numerous species of ethno-medicinal plants use, management and ways of preparation are threatened. Results also revealed that many of the traditional healers reported to transfer their knowledge and use of ethno-medicinal plants orally to their favorite family member. Such transfer of indigenous knowledge is liable to erosion as it could vanish when knowledgeable elders die before the knowledge is transferred. The practitioners know the importance of conserving medicinal plants; home gardens are good places for conservation of medicinal plants and for better transfer of the indigenous knowledge to the younger generation. Some traditional practitioners have started to conserve medicinal plants by cultivating at home gardens. This paves a way for knowledge on medicinal plants to pass from generation to generation. Moreover, some plant species like Rauvolfia serpentine, Elaeocarpus sphaericus, Meyna spinosa, Clerodendrum indicum, Zanthoxylam nitidum, Butea monosperma, Artemissiaindica, Asparagus racemosus, Cissus quadriangularis, Gomphostemma parviflora, Adhatoda vasica, Caesalpinia bonduc, Vitex nigundo, Alpinia allughas, Urtica dioica were found in threatened state in Dhemaji district. There might be some endemic plant species in the study areas which needs a detailed botanical study throughout the area.

Conclusion

Dhemaji district is relatively rich in medicinal plant diversity. Seventy six medicinal plants were recorded to treat human ailments. The medicinal plant species collected and identified were from both wild vegetation and home gardens. In the study area, 40 ailments were reported which are being treated by 76 traditional medicinal plants of the area. 27 herbs were found the dominant habits used for preparation of traditional remedies followed by 24 trees 22 shrubs and 3 climbers. Leaves were also found to be the most frequently used plant parts followed by roots for preparation of human remedies. Traditional medicine preparation mostly involves single plant; the mode of administration is mainly internal in which oral administration is the common route. The main threat for medicinal plants in the area arises from agricultural expansion, firewood, charcoal production, timber production and construction. Threat comes to medicinal plants due to lack of their sustainable utilization. Whereas threats that erode indigenous knowledge emanate from secrecy, oral based knowledge transfer, reluctance of young generation to gain the knowledge, unavailability of the species, influence of modern education and awareness factors are the major ones. Therefore, awareness rising should be made among the healers so as to avoid erosion of the indigenous knowledge and to ensure its sustainable use.

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