IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Quantitative Ethnobotanical study of wetland medicinal plants used by the Meitei community of Bishnupur District, Manipur

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ABSTRACT

BACKGROUND OF THE WORK: This paper represents the records of the quantitative data regarding the wetland medicinal plants used by the local Meitei community of Bishnupur district. Quantitative indices such as use value (UV), Informant consensus factor (FIC), and fidelity level (FL) were used to understand the preferences and consensus existing among the informants regarding the wetland medicinal plants used. **MATERIALS AND METHODS:** A total of 230 informants (135 males, 85 females) and 10 key informants who have traditional medicinal knowledge of the plants were selected for data analysis. Data collection and data analysis were done through frequent survey programs based on open-ended and semi-structured questionnaires. **RESULTS:** The study reveals that overall, 18 ailments categories were being treated with a total of 56 wetland medicinal plant species belonging to 50 genera that are distributed over 28 families. It was found that the Asteraceae family was the most dominant among all other families followed by Poaceae and Amaranthaceae. The informant consensus factor (Fic) for skeleton muscular system disorder (SMSD) was found to be the highest among all the ailment categories with a value of 0.86 followed by endocrinal disorder (ED) with a value of 0.82 and respiratory system disorder (RSD) with a value of 0.81. The Highest fidelity level was found in *Helichrysum luteoalbum* (L.) Rchb. with a value of 89 % which was included in the skeleton muscular disorder ailment category. Maximum FL determines high preference and potential of healing among the informant for treating a particular ailment. **CONCLUSION:** The wetland medicinal plants with the highest fidelity level (FL), use value (UV), and high informant consensus factor (FIC) from the present study indicate the possibilities of occurrence of the high rate of potential phytochemical compounds to carry out pharmacological and biochemical assay which could be led to the discovery of new drugs for the future.

Keywords: Wetland, Ethnobotanical, Quantitative, Informant consensus factor, Ailments

INTRODUCTION

Ethnobotany is the systematic study of plants and their practical uses through the traditional knowledge of local culture and people. Plants serve humans with food, shelter, medicine, and fodder for their animals (Towns and Van Andel, 2016). Ethnobotany and ethno medicinal plant studies are recognized as the most viable methods for identifying new medicinal plants and refocusing on the earlier reported bioactive constituents (Abujam e*t al.,* 2019). Therefore, studies and documentation on ethnobotanical and traditional knowledge of medicinal plant use have been considered a high priority sometimes leading to the discovery of crude drugs (Cox and Balick, 1994; 1996, Pieroni, 2000). The main focus of the ethnobotany is the documentation and preservation of traditional medicinal knowledge, community development, and conservation of endangered species (Ajaib *et al.,* 2014). Medicinal plants containing therapeutic agents have been used in healthcare to cure human diseases and nowadays still represent an important tool for the identification of novel drugs (Alarcon *et al*, 2015). Medicinal plants contain substances that can be used for therapeutic purposes and a large number of plants have been used in traditional systems for many years (Ahmad *et al.*, 2017).

Before the mid-1950s, research in ethnobiology was primarily descriptive, but by the mid-1980s researchers had already incorporated a variety of quantitative methods for data collection and data analysis into it (Philips *et al.,* 1994). The term quantitative ethnobotany is defined as the application of quantitative techniques to the direct analysis of contemporary plant-used data. Quantitative methods of analysing biological and cultural data can exist in the exploration of the nature of herbal medicine on various theoretical and practical levels. A goal of such approaches should be to add greater depth to our understanding of herbal medicine as a dynamic phenomenon. Concurrently, as we understand the context in which plants are used, we can better understand the function of specific herbal remedies. Wetlands are a vital source of food, raw materials genetic resources for medicine, and hydropower. Under Ramsar convention, a wetland is described as "areas of marsh, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salt, including areas of marine water the depth of which at low tides does not exceed six meters. Wetlands and its bio-resource are important to mankind and the products and services provided by wetlands are inexhaustible. Plants collected from the wetland are used by the local inhabitants for many purposes like food, fodder, and medicinal uses.

MATERIALS AND METHODS

Study area

Bishnupur is called the cultural and religious capital of Manipur. Bishnupur is located 27 km from Imphal. Bishnupur was formerly known as Lumlandong (now Lamadong). It is also the district headquarters of Bishnupur district which lies between 93.43ºE and 93.55ºE Longitude and 24.18ºN and 24.44ºN Latitude with a total geographical area of 496 km^2. which is bounded by Senapati and Imphal west district in the north, Churachandpur district in the west, Chandel in the southeast and Thoubal district in the east. Bishnupur district has a total population of 237,399 which made up 9.23% of the total population of Manipur (Census report, 2011). The district has two important places namely Keibul Lamjao National Park and Loktak Lake, the largest freshwater lake in northeast India. Most people residing in the Bishnupur district are Meitei, the most prominent ethnic group of Manipur. There are several other tribes and communities living such as Meitei

pangal, Naga, Kabui, Gangte, Kom, etc. Bishnupur district has got monsoon climate by receiving rainfall mainly from June to September every year.

Study Area: Map of Bishnupur district showing study sites

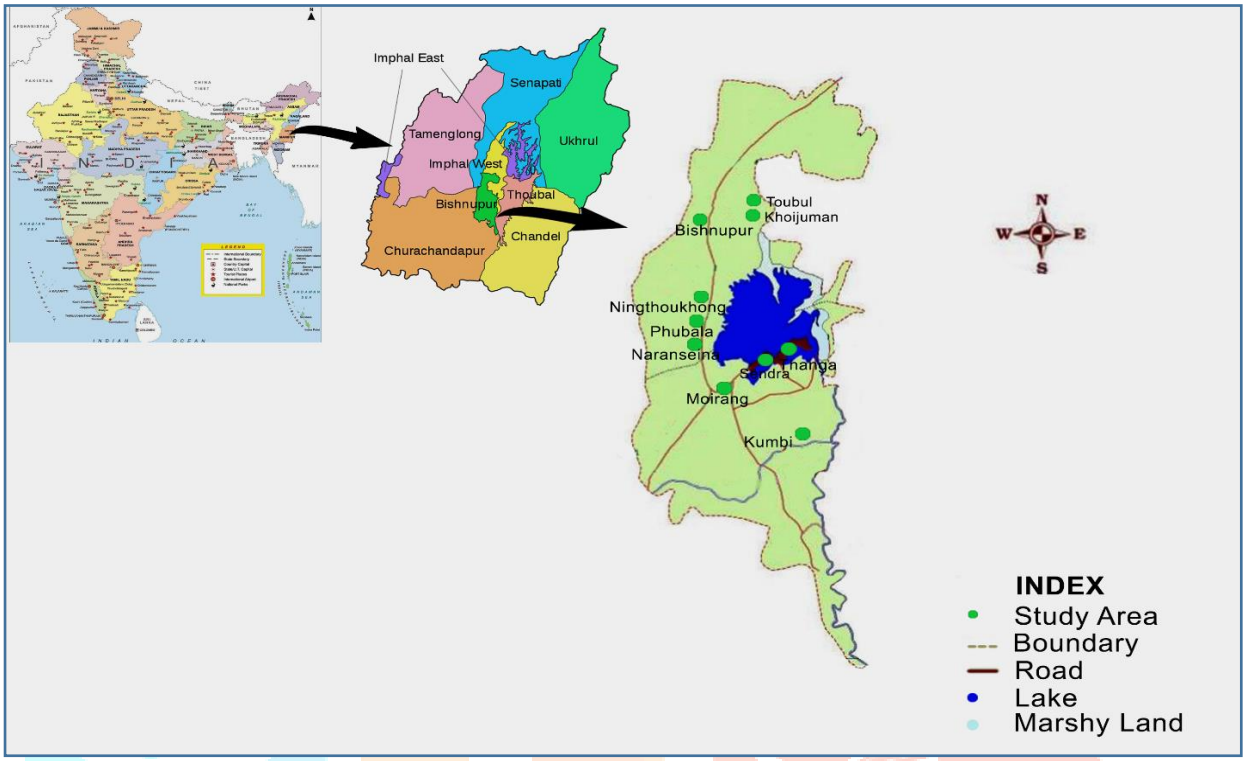

Fig 1. Map of Bishnupur district showing study areas.

Data Collection

The present study was conducted from December 2019 to January 2023 in Bishnupur district Manipur to interact and gather information on ethno-medicinal wetland plants for the treatment of diseases. Prior consent was obtained from local healers, herbal practitioners, the village chief, old folk, women, etc. The age group of all informants for between 20 to 80 years. 10 sites were selected through random sampling methods. 230 informants (135 males, 85 females, and 10 key informants) who have traditional medicinal knowledge of plants were selected for data analysis. Data collection and data analysis were done through frequent survey programs based on a semi-structured questionnaire which includes queries about the medicinal uses of these wetland plants, dosages, plant parts used, method of preparation, mode of application, disease type, and local name of the wetland plants. During the survey, medicinal wetland plants reported by the informants were verified and collected. Identification of the collected plants was done based on available literature (Hooker, 1882; Singh *et. al*, 2000). Classification, Author citation, and updated nomenclature are provided based on the plant list (www.plantlist.org), and the international plant Names Index (http://www.ipni.org); POWO (2000).

Table1: Demographic details of informants residing in the study site of Bishnupur district, Manipur.

Parameter	Informant Group	Number
Gender	Male Female	135 95
Age Group	Young (≤ 30 years) Senior (≥ 30 years)	147 83
Educational Status	Literate Illiterate	87 143
Informants	Key Informants General Informants	10 220

Data Analysis

Disease categories: The documented data of wetland medicinal plants were grouped into 18 disease categories.

Table2: Ailments categories and Biomedical terms.

Sl. No.	Ailment Categories	medical terms
1.	Liver Problem (LP)	Liver disorders, Jaundice
2.	Circulatory System Disorder (CSD)	Blood pressure, Blood clothing, ertension
3.	Antidote (Ad)	ke bite, Scorpion sting, Food poison
4.	Endocrinal Disorder (ED)	betes
5.	Respiratory System Disorder (RSD)	gh, Cold, Asthma
6.	Fever (Fr)	er
7.	Skeleton Muscular System (SMSD)	umatism, Headache
8.	Gastro Intestinal Disorder (GID)	nach ulcer, Dysentery, Stomach-ache, gestion, Diarrhoea, Constipation
9.	Ear, Nose, Throat problem (ENT)	throat, Eye vision, Retinitis, ht blindness, Epistatic
10.	Dermatological Infection (DI)	ls, Burns, Ringworm, Scabies, ammation, Skin rashes.
11.	Kidney Stone (KS)	ney stone
12.	Genito Urinary Disorder (GUD)	gnant complicacies, Menstrual disorder, uria, Strangury, Urinary disorder, resis, Leucorrhoea, Labour pain.
13.	Oral Care (OC)	thache, Aching gum
14.	Oncogenes (OG)	nours
15.	Piles (P)	s
16.	Deworming (DW)	rm expulsion
17.	Gout (GT)	t
18.	General Health (GH)	ic

The data collected from the informants during the survey were analysed by using three quantitative tools such as use value (UV), Informant consensus factor (Fic), and fidelity level (FL) which are given as follows:

Use Value (UV):

Use value demonstrates the relative importance of species known locally (Philips *et al*, 1994), which is based on the number of uses of a particular plant species and a number of informants that claimed the uses of the given plant. UV is calculated by using the formula

UV=∑ U/N, Where UV is the use value of the species,

U is the number of citations per species;

N is the number of informants.

High UV, signifies the importance of the particular plant to the community and is recorded when there is many use -reports for the plant while low UV is recorded when there are few use-reports.

Informant Consensus factor (Fic):

Informant Consensus factor or Fic was employed to identify the uniformity of the informants on the reported cures for the group of ailments. This method was based on the Informant Agreement Ratio (IAR) of Trotter and Logan (1986) and is consequently known today as the Informant Consensus factor. It was calculated using the following formula:

Fic = Nur – Nt/ (Nur – 1), where Nur is the number of use citations in each category and Nt is the number of species used.

Fic illustrates the degree of agreement among the informants to the use of a particular plant species and ranges between 0 and 1. This criterion can effectively sort out interesting plants for the search for novel drugs (Canales et al., 2005). High Fic values approaching 1 were obtained when the documented plants are used by a wide proportion of the informants for a selective disease category while low Fic shows disagreement among the informants which may be due to a lack of knowledge sharing (Heinrich et al., 1998).

Fidelity Level (FL):

The percentage of informants claiming the use of a certain plant for the same major purpose was calculated for the most frequently reported diseases by the Fidelity Level. It was developed by Friedman et al., (1986) and calculated using the following formula:

FL (%) = Np/N x 100, where Np is the number of informants claiming the use of a plant species to treat a particular disease and N is the number of informants that use the plants as a medicine to treat any given disease.

Fidelity levels are accounted as highest when the value nearly approaches 100 % where the particular plant species are reported as the most preferred for a certain ailment while low FLs denote the usage of the plants in many different ailments and are least preferred by the informants.

RESULT

The ethnobotanical data collected, identified, and documented from the 10 sites of Meitei inhabiting areas of Bishnupur district Manipur were critically analysed. A total of 56 wetlands medicinal plants belonging to 50 genera and 28 families were documented across 18 ailments. The family Asteraceae was the most represented with 8 plant species followed by Poaceae with 6 plant species followed by Ameranthaceae with 5 plant species (Fig.2). The most used plant parts were found to be leaves with 37%, whole plant with 23%, shoot with 14% and rhizome with 8% (Fig.3).

From the present study, it was found that the Informant consensus factor (Fic) values range from 0.83 to 60. Skeleton muscular system disorder (SMSD), Endocrinal Disorder (ED) and Respiratory system disorder (RSD) had the highest Fic of 0.83, 0.82, and 0.81 respectively. Higher Fic value (close to 1) higher degree of agreement between the informants of the selected wetland plant species to be used in treatment within a category of ailments while a low Fic value represents disagreement among the informant (Ragupathy *et al.*, 2008).

The highest use reports were recorded from Genito-urinary disorder (GUD) with 54 use reports and 16 plant species, Respiratory system disorder (RSD) with 33 use reports and 7 plant species, Dermatological infection (DI) with 27 use reports and 7 plant species. This indicates that there is a good amount of knowledge sharing

among the inhabitants residing in the study area regarding the use of wetland plants in the treatment of ailments. The lowest informant consensus factor (Fic) Value was found in the case of ear, nose, and throat problems (ENT) with 0.60 having 16 use reports and 7 plant species followed by Kidney stone (KS), Oncogenes (OG), deworming (DW) and Gout (Gt) with same Fic value of 0.66 and same use reports of 4 and 2 plant species each respectively. This indicates that there is a lack of knowledge sharing and miscommunication among the informants of the study area in the treatment of these particular ailments categories.

The highest use value was recorded from *Ageratum conyzoides* L. with 8 use reports by 11 informants giving the value of 1.1 followed by *Jussiaea repens* L., *Acorus calamus* L., *Nelumbo nucifera* Gaertn., *Euryale ferox* Salisb., and *Mimosa pudica* L. with same 6 use report by 10 informants giving the same value of 1 each followed by *Helichrysum luteoalbum* (L.) Rchb. with 8 use reports by 9 informants giving the value of 0.9. The major agreements within the ailments categories highlighting the most important wetland plant species were listed in table 4. The lowest use value was recorded from *Polygonum plebeium* R. Br with only one informant with a value of 0.1 and the particular informant was using this wetland plant species during Dysuria regularly. The plant with low use value (UV) of 2 which is reported by only two informants in the present study was *Arundo donax* L., *Acmella paniculate* (Wall.ex.D.C) R.K. Jansen., *Colocasia esculenta* (L.) Schoot. *Chenopodium album* L., *Equisetum debile* Roxb. ex. Vaucher, *Plantago erosa* Wall. and *Rumex maritimus* L.

Table3: The number of use reports, use value, and mode of administration for the wetland medicinal plant and herbal therapy used by the Meitei community Bishnupur district, Manipur.

Sl. No.	Plants name	Family	Local name	Parts used	Ailments category: No. of use- report	Use value (UV)	Administration and preparation
1	*Achyranthus aspera* L	Amaranthaceae	*Khuchumpere*	leaves	GID:3 (stomach ulcer) Ad:4 (snake bite)	0.70	Oral/topical (decoction; paste)
2	*Acmella paniculate* (Wall.ex DC.) R. K Jansen.	Asteraceae	*Lalu-kok*	leaves	OC:2 (toothache)	0.20	Oral(paste)
4	*Ageratum conyzoides* L.	Asteraceae	*Khongjai-Napi*	Leaves	CSD:8 (blood pressure) GUD:3 (pregnant complicacies)	1.10	Topical (paste/leaf extract)
5	*Ageratum haustoniaum* Mill.	Asteraceae	*Khongjai-Napi*	Whole plant	GUD:4 (Mensural disorder)	0.40	Oral (decoction)
6	*Alpinia galanga* Willd.	Zingiberaceae	*Pullei*	Rhizome	RSD:5 (cough) ENT:2 (sore throat)	0.70	Oral (decoction)
7	*Alternanthera sessilis* (L). R Br.ex DC.	Amaranthaceae	*Phakchet*	Whole plant, Root	GID:2 (dysentery) DI:6 (boils)	0.80	Oral /topical (decoction/paste)
8	*Alternanthera philoxeroides* (Mart). Grisseb	Amaranthaceae	*Kabo-Napi*	Shoot	GID:4 (diarrhoea)	0.40	Oral (infusion)
9	*Amarnathus spinosus* L	Amaranthaceae	*Chengkruk-Tingkhangpanbi*	Leaves, Shoot	ED:3 (boils) Gt:1 (gout)	0.40	Oral/Topical (decoction, paste)
10	*Arundo dona* L.	Poaceae	*Yenthou*	Shoot	DW:2 (Worm expulsion)	0.20	Oral (Decoction)
11	*Amarnathus virides* L	Amaranthaceae	*Chengkruk*	Leaves, Whole plant	GID:2 (constipation)	0.20	Oral (cook)
12	*Centella asiatica* (L) Urb.	Apiaceae	*Peruk*	Whole plant	CSD:3 (hypertension) GH:1 (tonic)	0.40	Oral (decoction/cooked)

13	*Cardamine hirsute* L.	Brassicaceae	*Chantrukman*	Whole plant	GID:5 (urinary disorder)	0.50	Oral (cooked)
14	*Coix lachryma jobi* L.	Poaceae	*Chaning*	Leaves	GUD:3 (dysuria)	0.30	Oral (decoction)
15	*Colocasia esculenta* (L) schoot	Araceae	*Lampan*	Petiole	CSD:2 (blood clotting)	0.20	Topical (paste)
16	*Crassocephalum crepidioides* S. Moore	Asteraceae	*Tera paibi*	Leaves	GID:4 (stomach ulcer)	0.40	Oral (Leaf extract)
17	*Chenopodium album*. L	Chenopodiaceae	*Monsaobi*	Shoot	LP:2 (Liver disorder)	0.20	Oral (Decoction)
18	*Cymbopogon citrates* (DC)Stapf	Poaceae	*Charot*	Leaves	Fr:2 (Fever)	0.20	Oral (Decoction)
19	*Cynodon dactylon*(L)Pers	Poaceae	*tingthou*	Whole plant, Root	GID:3 (Stomach-ache) GUD: (Dysuria)	0.40	Oral (juice)
20	*Dichrocephala integrifolia* Kuntz.	Asteraceae	*Lalukok*	Leaves	GID:2 (Indigestion) GUD:1 (Labour pain)	0.30	Oral (Decoction)
21	*Drymaria cordata*(L) Willd. ex Schult.	caryophyllaceae	*Tandan pambi*	Whole plant	RSD:6 (Asthma) ENT:2 (Night blindness)	0.80	Inhalation/Oral (Smoke/Decoction)
22	*Eclipta prostrata*(L.) L.	Asteraceae	*Uchi sumban*	Leaves	Fr:3 (Fever)	0.30	Oral (Decoction)
23	*Enhydra Fluctuans* Lour.	Asteraceac	*Komprek tujombi*	Whole plant	Gt:3 (Gout) Ad:2 (Food poison)	0.50	Oral (Decoction/Juice)
24	*Euphorbia hirta* L.	Euphorbiaceae	*Pakhangba maton*	Whole plant	RSD:5 (Asthma) GUD:2 (Leucorrhoea)	0.70	Oral (Dec0ction)
25	*Equisetum debile* Roxb.ex Vaucher.	Equisetaceae	*Lai-utong*	Whole plant	ENT:2 (Epistasis)	0.20	Inhalation
26	*Euryale ferox* Salisb.	Nympheaceae	*Thajing*	Leaves, Seed	GUD:6 (leucorrhoea)GH:4 (Tonic)	1.00	Topical/Oral (Infusion, Cooked)
27	*Helichrysum luteoalbum* (L.) Rchb.	Asteraceae	*Phunin*	Leaves	SMSD:8 (Headache) LP:1 (Liver disorder)	0.90	Topical (Paste)
28	*Hedyotis Auricularia* L.	Rubiaceae	*Langban koukha*	Leaves	LP: 4 (Jaundice)	0.40	Oral (Infusion)
29	*Hedycium coronarium* J. Koenig	Zingiberaceae	*Loklei*	Rhizome	RSD:5 (Cough) Fr:3 (Fever)	0.80	Oral (Decoction)
30	*Hydrocotyle sibthorpioides* Lam.	Apiaceae	*Lai-peruk*	Leaves	LP:3 (Jaundice) Fr:2 (Fever)	0.50	Oral (Fresh leaves extract)

31	*Ipomoea aquatica* Forssk.	Convolvulaceae	*Kolamni*	Shoot, Leaves, Whole plant	P:2 (Piles) ENT:3 (Retinitis)	0.50	Oral/Topical (Infusion, Paste)
32	*Jussiaea repens* L.	Onagraceae	*Ishing kundo*	Leaves	DI:4 (Boils) ED:6 (Diabetes)	1.00	Topical/Oral (Paste, Cooked)
33	*Jussiaea suffruticosa* L.	Onagraceae	*Tebo*	Leaves, Shoot	OC:3 (Aching gum) GUD:2 (Strangury)	0.50	Oral (Paste, Decoction)
34	*Kyllinga brevifolia* Rottb.	Cyperaceae	*Shembang kouthum*	Rhizome , Leaves	OG:2 (Tumors) CSD:2 (Blood clothing)	0.40	Oral/Topical (Juice, Paste)
35	*Lantana camera* L.	Verbanaceae	*Thirei*	Leaves	DI:3 (Skin rashes) OG:2 (Tumors)	0.50	Topical/Oral (Paste, Decoction)
36	*Leucas aspera* (Willd.) Link.	Lamiaceae	*Mayang lembum*	Leaves	RSD:3 (Cold) DI:4 (Inflammation)	0.70	Oral/Topical (Infusion, Paste)
37	*Lindernia ruellioides* (Colsm.) Pennell	Linderniaceae	*Kihoman*	Whole plant	KS:1 (Kidney stone)	0.10	Oral (Decoction)
38	*Mimosa pudica* L.	Mimosaceae	*Kangphal ikaithabi*	Leaves	P:4 (Piles) GUD:6 (Leucorrhoea)	1.00	Topical (Boiled)
39	*Neptunia oleraceae* Lour.	Mimosaceae	*Eshing ikaithabi*	Leaves	GID:5 (Dysentery)	o.50	Oral (Cooked)
40	*Nymphoides indica* (L.) Kuntze.	Gentianaceae	*Tharo macha*	Whole plant	DI:2 (Scabies) Ad: 3 (Scorpion sting)	0.50	Topical (Fresh leaf extract)
41	*Nymphaca stellata* Willd.	Nympheaceae	*Thariktha*	Whole plant, Rhizome	LP:3 (Liver disorder) GUD:4 (Menstrual disorder)	0.70	Oral/Topical (Decoction, Paste)
42	*Nelumbo nucifera* Gaertn.	Nelumbonaceae	*Thambal*	Rhizome , Seed	ED:4 (Diabetes) ENT:6 (Eye vision)	1.00	Oral (Juice, Raw)
43	*Rorippa indica* (L.) Hiern	Brassicaceae	*Uchi-hangam*	Shoot	ED:5 (Diabetes) KS:3 (Kidney stone)	0.80	Oral (Cooked)
44	*Oenanthe javanica* (Blume) DC.	Apiaceae	*Komprek*	Shoot	DW:2 (Worm expulsion) GUD:1 (Diuresis)	0.30	Oral (Cooked)
45	*Oxalis corniculate* L.	Oxalidaceae	*Yensil*	Whole plant	SMSD:3 (Rheumatism)	0.30	Oral (Cooked)
46	*Polygonum barbatum* L.	Polygonaceae	*Yellang*	Leaves	GUD:7 (Diuresis)	0.70	Oral (Decoction)

47	*Plantago erosa* Wall.	Plantaginaceae	*Yempat*	Leaves, Root	P:2 (Piles)	0.20	Topical (Boiled)
48	*Polygonum plebeium* R.Br.	Polygonaceae	*Tharam mana*	Leaves	GUD:1 (Dysuria)	0.10	Oral (Decoction)
49	*Polygonum hydropiper* L.	Polygonaceae	*Chaokhong*	Shoot, Seed	Fr:3 (Fever) GID:5 (Dysentery)	0.80	Topical/Oral (Paste, Infusion)
50	*Polygonum minus* Huds.	Polygonaceae	*Chaokhong macha*	Shoot	GUD:4 (Strangury)	0.40	Oral (Raw)
51	*Pistia stratiotis* L.	Araceae	*Kangjao*	Whole plant	DI:6 (Boils)	0.60	Topical (Paste)
52	*Rumex maritimus* L.	Polygonaceae	*Torong khongchak*	Leaves, Stem	DI:2 (Burns, Ringworm)	0.20	Topical (Paste)
53	*Rotala rotundifolia* (Buch. -Ham.ex Roxb.) Koehne	Lythraceae	*Labuk leiri*	Whole plant	GUD:5 (Urinary disorder)	0.50	Oral (Decoction)
54	*Sagittaria sagittifolia* L.	Alismataceae	*Koukha*	Root, Leaves	RSD:5 (Cough) ENT:1 (Sore throat)	0.60	Oral (Decoction, Fresh)
55	*Setaria italica* (L.) P.Bleauv.	Poaceae	*Hoop*	Grain	SMSD:5 (Rheumatism)	0.50	Topical (Paste)
56	*Zizania latifolia* (Griseb.) Turcz. ex Stepf.	Poaceae	*Ishing-kambong*	Culm, Twig	GUD:4 (Diuresis)	0.40	Oral (Infusion, Raw)

Table4: Informant consensus factor of the wetland medicinal plants documented from Meitei community of Bishnupur district Manipur.

Sl. No.	Ailment Categories	No. of use Report (Nur)	Number of taxa (NT)	Informant consensus factor (Fic)
1.	Liver Problem (LP)	15	5	0.71
2.	Circulatory System Disorder (CSD)	15	4	0.78
3.	Antidote (Ad)	9	3	0.75
4.	Endocrinal Disorder (ED)	18	4	0.82
5.	Respiratory System Disorder (RSD)	33	7	0.81
6.	Fever (Fr)	19	6	0.72
7.	Skeleton Muscular System (SMSD)	16	3	0.86
8.	Gastro Intestinal Disorder (GID)	30	9	0.72
9.	Ear, Nose, Throat problem (ENT)	16	7	0.60
10.	Dramatological Infection (DI)	27	7	0.76
11.	Kidney Stone (KS)	4	2	0.66
12.	Genito Urinary Disorder (GUD)	54	16	0.71
13.	Oral Care (OC)	5	2	0.75
14.	Oncogenes (OG)	4	2	0.66
15.	Piles (P)	8	3	0.71
16.	Deworming (DW)	4	2	066
17.	Gout (GT)	4	2	0.66
18.	General Health (GH)	5	2	0.75

Table5: Fidelity level (FL) values of some of the wetland medicinal plants as claimed by the Meitei Traditional healers against different ailments.

Ailment category	Most Preferred species	Np	N	FL (%)
Liver problem (LP)	*Hydrocotyle sibthorpioides* (Jaundice)	5	7	71.42
Circulatory system disorder (CSD)	*Ageratum conyzoides* (Blood pressure)	8	11	73
Endocrinal disorder (ED)	(1) *Jussiaea repens* (Diabetes) (2) *Rorippa indica* (Diabetes)	6 5	10 8	60 62.5
Respiratory system disorder (RSD)	(1) *Alpinia galanga* (Cough) *(2) Drymaria cordata (Asthma)* (3) *Euphorbia hirta* (Asthma) (4) *Hedycium coronarium* (Cough)	5 6 5 5	7 7 7 8	71.42 75 71.42 62.5
Skeleton muscular system disorder (SMSD)	*Helichrysum luteoalbum* (Headache)	8	9	89
Gastro intestinal disorder (GID)	*Polygonum hydropiper* (Dysentery)	5	8	62.5
Ear, nose, throat problem (ENT)	*Nelumbo nucifera* (Eye vision)	6	10	60
Dermal infection (DI)	*Alternanthera sessiles* (Boils)	6	8	75
Genito-urinary disorder (GUD)	(1) *Euryale ferox* (Leukorrhea) (2) *Mimosa pudica* (Leukorrhea)	6 6	10 10	60 60

Graph of Family and Plant parts

Family

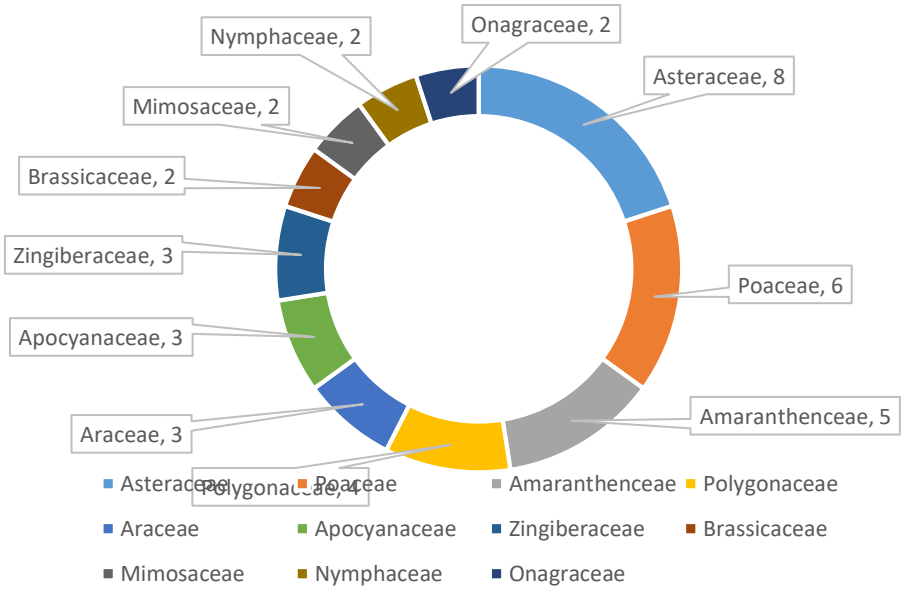

Fig 2. Plant family used by the Meitei community as medicine.

Plant parts

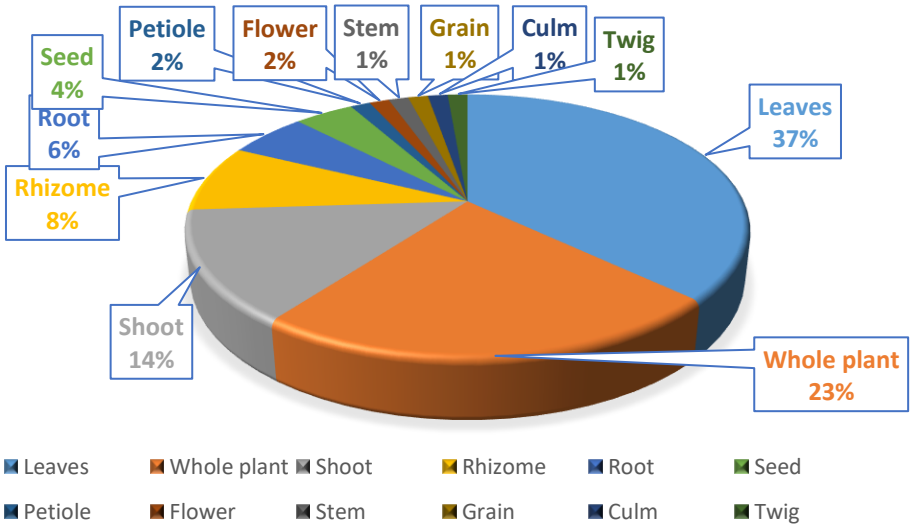

Fig 3. Percentage of plant parts used by the *Meitei* community as medicine.

DISCUSSION:

To determine the major agreement of the uses of the most important wetland plants in each ailment category was analysed by using fidelity level. Out of the 56 total wetland medicinal plants documented, 15 species were selected for all the ailment categories which were used in the treatment of single or more than one ailment with multiple informants. The plant with less than three use reports was not considered for the analysis. The wetland plant species with the highest fidelity level of 89% in a single ailment was *Helichrysum luteoalbum* (L.) Rchb. Other wetland medicinal plants with high fidelity levels are *Alternanthera sessiles* (L.) R.Br.ex DC. *Drymaria cordata* (L.) Willd. with 75% followed by *Ageratum conyzoides* L. with 73% followed by *Alpinia galanga* Willd., *Euphorbia hirta* L., and *Hydrocotyl sibthorpioides* Lam. with 71.42 % each. Maximum FL determines

high preference and potential of healing among the informants for treating a particular ailment. The calculation also agrees with the Fic value of the present study. The frequently reported ailment Skeleton Muscular Disorder (SMSD) had the highest Fic value and *Helichrysum luteoalbum* (L.) Rchb. used in the treatment of this particular ailment category also recorded the highest fidelity level of 89 %. The wetland medicinal plants with the highest fidelity (FL), use report (UV), and high informant consensus factor (Fic) from the present study indicates the possibility of the high rate of availability of potential phytochemical compounds and therefore priority should be given to conserving these plants to carry out pharmacological and biological assay which could be led to the discovery of new drugs for the future (Dutta and Dutta, 2005, Hamil *et al.*, 2000).

CONCLUSION

The Traditional knowledge and ethno-medicinal preparation recorded in the present study can be implemented in future for pharmacological and biological assay which could further lead to new development of drugs. Further priority should be given to the plant with high use value, informant consensus factor and fidelity level in developing novel drug for the future.

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