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STUDIES ON THE ETHNO-MEDICINAL PLANTS AND THEIR TRADITIONAL USES AMONG THE MARMA COMMUNITY OF ROWANGCHHARI UPAZILA OF BANDARBAN DISTRICT, BANGLADESH

M. S. Alam[1*], M. M. Rahman[2], R. Haider[1], T. K. Ray[1] and M. M. Rahman[3]

[1]Minor Forest Products Division, Bangladesh Forest Research Institute (BFRI), Chattogram; [2]Department of Botany, Jahangirnagar University (JU), Dhaka; [3]Institute of Disaster Management and Vulnerability Studies, Dhaka University (DU), Dhaka. Bangladesh

Abstract

Indigenous communities of the Rowangchhari upazila mostly depend on ethnomedicine for their primary health care. The purpose of the present study was to document significantly distinguishable ethno-medicinal plants and their ethno-pharmacological applications among the Marma community of Rowangchhari upazila of Bandarban Hill District. In this study, interviews and group discussion were conducted from July 2019 to December 2021 to obtain ethno medicinal data from the local herbalist and elderly villagers. Simultaneously, medicinal plants were also collected and recorded from natural wild habitats as well as from local markets during the study period. Local/village doctors (Baiddays) were also consulted regarding the names and uses of traditional medicinal treatments. In this study, a total of 81 medicinal plant species under 76 genera and 42 families have been recorded and documented, which have been used for the treatment of different ailments. Plant species used by herbal practitioners are mostly herbs (38%) and the representative from Euphorbiaceae family contained the maximum species (8). The most frequent usage category of ailments reported was skin problems. The majority of the remedies were prepared from juice (38%) and leaves were the most frequently used plant part (42%). The most widely used medicinal plants included, *Achyranthes aspera* L., *Terminalia chebula* Retz., *Abelmoschus moschatus* Medik., *Ageratum conyzoides* L., *Blumea balsamifera* DC. and *Centella asiatica* (L.) etc.

Keywords: Marma, Medicinal plants, Rowangchhari, Traditional uses

Introduction

Human beings are indispensably dependent on plants for their survival. Use of plants to treat several ailments has been a prehistoric value in human civilization. Still now plants are key source of therapeutic drugs. According to the World Health Organization (WHO), more than 80% of people in under developed countries rely on traditional medicine (Behera, 2006) the majority of which is derived from plants (Senthilkumar *et al*., 2013). For the majority of rural populations, medicinal plants play a key role in primary healthcare systems (Hamayun *et al.,* 2003). The indigenous people of different countries of the world, living amid nature, have first-hand knowledge on

* Corresponding author: sahalam25@yahoo.com

benefits provides by the plants including medicinal value. Plants were utilized not just for the treatment of various ailments, but also as preventative measures against various ailments (Rahmatullah *et al.,* 2010). A number of significant modern pharmaceuticals have been derivative from plants used by indigenous people (Balick and Cox, 1996) including antibiotics, anti-malarial drugs, cardiotonics, sympatho and para-sympathomimetics etc. Yusuf *et al*., (2007) provide information on 69 medicinal plants used by the Chittagong Hill Tracts tribal people. Mohiuddin *et al*. (2012) reported ethno medicinal knowledge on 70 plant species belonging to 36 families that were used by the Marma, Bwam, Murang and Tanchangya tribes in the Bandarban hill areas. According to Rahman, (2010), the majorities of the country's tribal groups live in hilly areas and rely on herbal medicine for primary healthcare.

Ethno medicinal information about the uses of medicinal plants can be a valuable resource for scientists searching for new medications, as well as having a significant bio economic influence in the future (Ghiselin and Landa, 2005). Furthermore, plant-based medicine is becoming more well-known and used around the world (Tugume *et al*., 2016). Indigenous peoples in extreme rural places who live in harmony with nature and preserve a close bond between man and environment are also familiar with the usage of therapeutic plants (Senthilkumar *et al*., 2013). Native knowledge developed by people living in a specific community is unique, and it can help indigenous people develop a sustainable development strategy (Biswas *et al*., 2011). The Marma communities of Chittagong Hill Tracts retain such kind of knowledge particularly from their healthcare perspective, which is transferred from generation to generation by oral directives. The indigenous knowledge may vary within the same community living aloof in almost inaccessible pockets of hilly regions. Marma, commonly known as Maghs, is the second largest tribe in Bandarban hill district, with the majority of members living in inaccessible hills. They use a number of plants for the treatment of different complaints (Alam, 1992). A number of ethno medicinal investigations among herbal practitioners in Bangladesh's Chittagong Hill Tracts have been reported (Motaleb *et al.,* 2013; Yusuf *et al.,* 2006; Rahman *et al.,* 2007; Rahmatullah *et al.,* 2011; Khisha *et al.,* 2012; Sarker *et al.,* 2012; Esha *et al.,* 2012; Hanif *et al.,* 2009; Uddin *et al.,* 2004).

Most of the Marma tribes have a basic knowledge of medicinal plants that are used for first aid cures for coughs, colds and fever. This type of knowledge passed down through generations mostly by oral tradition. But unfortunately traditional medicinal healers have gradually migrated to other jobs in recent years in search of a better lifestyle. As a result, traditional medical knowledge is rapidly dwindling. Indigenous knowledge must be documented in order to conserve and use biological resources. However, there is very little information available on the ethno-medicinal plants used by Marma communities. The current study was carried out to document some valuable traditional knowledge on herbal treatment by Marma communities of Rowangchhari upazila in the Bandarban Hill District.

Materials and Methods

The present investigation was carried out for about two and a half years from July 2019 to December 2021 in Rowangchhari upazila in the Bandarban Hills District of Bangladesh. Total area of Rowangchhari upazila is 442.89 sq km, located in between 22°03' and 22°20' north latitudes and in between 92°14' and 92°30' east longitudes. The

upazila consists of 4 Unions/Wards, 15 Mauzas/Mahallas. The total population of Roangchhari upazila is 27,264. Of these, 14,243 are males and 13,021 are females. A total of 8.51% of the population is Muslim, Hindu, 0.97%, 68.90%, Buddhists, Christians, 16.64% and 4.98% others (BBS, 2011). The upazila is inhabited by Marma, Chakma, Tripura, Thanchangya, Murang, Bawm, Kheyang, Khumi and other ethnic groups. The Marmas are the largest tribe inhabiting the forested hilly region in the Rowangchhari upazila of Bandarban Hill District. Three different paras namely Mandui para, Rowangchhari bazar para and Bijoy para were randomly selected to execute the present investigation. Documentation was made by conducting as many random interviews as possible with traditional health practitioners, elderly men and women. The interview procedure was chosen by employing open-ended and semi-structured questioning techniques, which were then noted. Information collected on the mentioned local names, uses, and methods of use, diseases for which the formulations were used and dosages. For better information about ethno medicinal plants three prominent seasons (winter, summer and monsoon) of the year were selected. An interpreter was involved during data collection and sharing who had translated the local language into Bengali. To validate the collected information, it was cross-checked in the field. The common plant samples were identified in the field by the authors and the unidentified species were preserved in the herbarium sheet and finally identified with the help of plant taxonomists of Forest Botany Division of Bangladesh Forest Research Institute, Chattogram and Bangladesh National Herbarium, Dhaka. Voucher specimens were deposited in the herbarium of Bangladesh Forest Research Institute (BFRI).

Results and Discussion

The present study documented 81 plant species under 42 families in 76 genera that are traditionally used for the treatment of 99 different health conditions (Table 1). The plants are listed with their scientific name, vernacular name, Marma name, habit, plant parts used, mode of use and ailments treated. Among the families, Euphorbiaceae represented the highest number of (8) of medicinal plant species, followed by Asteraceae (7), Lamiaceae (5), Apocynaceae and Zingiberaceae (4), Acanthaceae, Caesalpiniaceae and Solanaceae (3), Araceae, Fabaceae, Malvaceae, Mimosaceae, Piperaceae, Rubiaceae, Rutaceae, Sapindaceae, Scrophulariaceae, Verbenaceae and Vitaceae shared 2 species individually. The rest of the families comprised one species each (Fig. 1). In life form, herbs (38%) were found to be the most used plant, followed by shrubs (27%), trees (21%) and climbers (14%) respectively (Fig. 2). According to Baydoun *et al*., (2015) herbs were dominantly used in herbal preparations due to their medicinal properties and to serve various primary human ailments and therapeutic indications.

The most used plant part was leaves (42%) followed by root (20%), whole plant (12%), bark (9%), rhizome (5%), flower and fruit (4%), seed (2%), stem and latex (1%) (Fig. 3). The simple collection of leaves compared to other parts of the plant makes it a favorite for herbal preparation (Giday *et al*., 2003). Besides, leaves are the most active part of the plant in terms of the production of metabolites and photosynthesis (Ghorbani, 2005). Moreover, easy collection and availability make the leaves and flowering parts common for herbal practitioners (Baydoun *et al*., 2015).

Table 1. List of plants used by the Marma people for treating different ailments

Sl. No	Scientific name	Vernacular Name	Marma Name	Family	Habit	Plant parts used	Ailments
1.	*Abelmoschus moschatus* Medik.	Musakdana	Falu mao wabang	Malvaceae	Herb	Leaf, root and seed	Snake bite, cough, fever, anemia and tonsillitis
2.	*Achyranthes aspera* L.	Apang	Chai-chi	Amaranthaceae	Herb	Whole plant	Carbuncle, constipation, body pain, dropsy and gynecological complexity
3.	*Actinostemma tenerum* Griff.	Golapata	Kangbui	Cucurbitaceae	Herb	Leaf and flower	Hydrocele and abdominal pain
4.	*Adenosma indianum* (Lour.)	Barakesuti	Puro peteng	Scrophulariaceae	Herb	Leaf	Asthma
5.	*Ageratum conyzoides* L.	Fulkuri	Wichee	Asteraceae	Herb	Leaf	Cutting wounds, edema, sneezing, hiccup and headache
6.	*Allophyllus cobbe* (L.) Raeusch.	Aitachita	Si sa calaai	Sapindaceae	Shrub	Leaf and root	Wound healing, skin diseases, hydrocele and rheumatic pain
7.	*Alocasia acuminata* Schoot	Pata bokakachu	Mohra pring	Araceae	Herb	Rhizome and stem sap	Skin diseases and earache
8.	*Alpinia conchigera* Griff.	Konchi elachi	Padagrah	Zingiberaceae	Herb	Rhizome	Gastric pain, dyspepsia, stomach pain and diarrhea
9.	*Alstonia scholaris* (L.) R. Br.	Chhatim	Choilibang	Apocynaceae	Tree	Stem bark and latex	Rheumatic pain, gout and skin diseases
10.	*Baliospermum solanifolium* (Burm. f.)	Danti	Tung kra mon	Euphorbiaceae	Shrub	Leaf, bark and root	Rheumatic pain, enlarged spleen and burning sensation of the body
11.	*Bauhinia acuminata* L.	Shet kanchan	Thangba pang	Caesalpiniaceae	Tree	Leaf, root and bark	Epilepsy, jaundice and leprosy
12.	*Begonia roxburghii* (Miq.) DC.	Gonirakto	Kayokha khine	Begoniaceae	Herb	Whole plant	Stone in urinary tract, intestinal worms, spleen problem and jaundice
13.	*Blumea balsamifera* DC.	Nagor chandal	Seratagun gach	Asteraceae	Shrub	Leaf	Gout, edema, leg pain, cough and chronic eye diseases
14.	*Bridelia retusa* (L.) A. Juss.	Katakoi	Faima	Euphorbiaceae	Tree	Root	Cough, fever and leucorrhoea
15.	*Cardiospermum halicacabum* L.	Lataphatki	Nalamaichi	Sapindaceae	Climber	Whole plant	Whooping cough, chicken pox, healing wounds and asthma
16.	*Centella asiatica* (L.) Urban	Thankuni	Mrang khua	Apiaceae	Herb	Leaf	Blood dysentery, indigestion, conjunctivitis, insomnia and wound heal
17.	*Chromolaena odorata* (L.) R.M.king	Bara shialmuti	Aga bya	Asteraceae	Herb	Whole plant	Cough, gastric and wound heal

Table 1. Contd.

Sl. No	Scientific name	Vernacular Name	Marma Name	Family	Habit	Plant parts used	Ailments
18.	*Cissus quadrangularis* L.	Harjora	Harsanga	Vitaceae	Climber	Whole plant	Fracture bone, indigestion, cancer and peptic ulcer
19.	*Cissus repens* Lam.	Marmaria lata	Oarong khaen	Vitaceae	Climber	Leaf	Jaundice and boils
20.	*Clausena heptaphylla* (Roxb.)	Panmouri	Rowak cu ba	Rutaceae	Shrub	Leaf and root	Cancer, fever, hysteria and mental disorder
21.	*Clerodendrum wallichii* Merr.	Tara tabah bhat	Tara tabo gach	Verbenacaeae	Shrub	Leaf and root	Fever, skin allergy, abdominal pain and boils
22.	*Commelina benghalensis* L.	Dholpata	Marakh aunge	Commelinaceae	Herb	Leaf	Malnutrition, leprosy and sores
23.	*Costus speciosus* (J. Koenig) Sm.	Keu	Premdaba	Costaceae	Herb	Whole plant	Evil spirit, indigestion, paralysis and earache
24.	*Crateva magna* (Lour.) DC.	Barun	Kainthak	Capparaceae	Tree	Stem bark and root	Rheumatic pain and contraceptive
25.	*Curcuma longa* L.	Halud	Nanhuo	Zingiberaceae	Herb	Rhizome	Wound healing, dysentery, fracture bone and stomachache
26.	*Cyclea barbata* Miers	Thangbandri	Tuwang-noyee	Menispermaceae	Climber	Leaf and root	Easy delivery, body pain and epilepsy
27.	*Cymbopogon citratus* (DC.)	Lebugandhi ghas	Chabalan apan	Poaceae	Herb	Leaf	Nasal congestion, cough and tuberculosis
28.	*Datura metal* L.	Dhutura	Dutra gach	Solanaceae	Shrub	Leaf and fruit	Headache, skin diseases and tumor
29.	*Dillenia pentagyna* Roxb.	Hargaza	Harjola	Dilleniaceae	Tree	Bark	Blood dysentery, diarrhea, tuberculosis and pneumonia
30.	*Eclipta prostrata* (L.) L.	kalokeshi	Bahushi	Asteraceae	Herb	Whole plant	Resists hair fall, constipation and boils
31.	*Elatostema papillosum* Wedd.	Silajhara	Pokri	Urticaceae	Herb	Leaf and root	Abscess, pneumonia and paralysis
32.	*Entada rheedii* Spreng.	Gilagach	Gilanoi	Mimosaceae	Climber	Whole plant	Skin diseases, bowel complaints and wound healing
33.	*Ficus hispida* L.f.	Kakdumur	Fah-shai-ba	Moraceae	Tree	Fruit and root	Stop vomiting, epilepsy and menstrual hemorrhage
34.	*Flueggea virosa* (Roxb. *ex* Willd.)	Khaukra	Repapok	Euphorbiaceae	Shrub	Root	Burning eye, small pox and gonorrhea
35.	*Holarrhena antidysenterica* (L.)	Kurchi	Lakthu	Apocynaceae	Tree	Bark	Threadworm, abdominal pain, dysentery and mouth sore
36.	*Ichnocarpus frutiscens* (L.) R. Br.	Syamalota	Langibkhe nuyee	Apocynaceae	Climber	Leaf	Stop bleeding, fever and ham
37.	*Ixora coccinea* L.	Rangon	Kaya machaoi	Rubiaceae	Shrub	Root and flower	Hiccup, fever, leucorrhoea and dysmenorrhea

Table 1. Contd.

Sl. No.	Scientific name	Vernacular Name	Marma Name	Family	Habit	Plant parts used	Ailments
38.	*Jasminum sambac* (L.) Aiton	Beli	Kyaklung pai	Oleaceae	Shrub	Leaf and root	Fever, insect bite, abdominal pain and urinary tract infection
39.	*Jatropha gossypifolia* L.	Laljeol	Karachuni	Euphorbiaceae	Shrub	Leaf and root	Fistula, hydrocele and excessive menstruation
40.	*Justicia adhatoda* L.	Basok pata	Lespu pang	Acanthaceae	Shrub	Leaf	Cough, cold, fever and asthma
41.	*Kaempferia galanga* L.	Sugandi bach	Mirisiga	Zingiberaceae	Herb	Leaf and rhizome	Sore eyes, headache and flatulence
42.	*Leucas zeylanica* (L.) R. Br.	Shetodrone	Pai thung sa	Lamiaceae	Herb	Whole plant	Fever, gout and blistery
43.	*Leucus aspera* (Willd.) Link.	Dondakolos	Pi tung cha	Lamiaceae	Herb	Whole plant	Tonsillitis, cough and headache
44.	*Litsea glutinosa* (Lour.) Robinson	Menda	Cheng pichalla	Lauraceae	Tree	Bark, leaf and root	Joint pain, blood dysentery and tumor
45.	*Melastoma malabathricum* L.	Ban tezpata	Bum bium bam	Melastomaceae	Shrub	Root and leaf	Toothache, boils, dysentery, scabies and gynecological problem
46.	*Merremia vitifolia* (Burm.f.)	Kormolata	Khyai pacha	Convolvulaceae	Climber	Leaf and root	Injury, inflammation and stomachache
47.	*Micromelum minutum* (J. G.Forster)	Dulia	Pukhong cheyinga	Rutaceae	Tree	Leaf and bark	Tooth decay, evil spirit and headache
48.	*Mikania cordata* (Burn. f.) Robinson	Refuzi lata	Woalaban	Asteraceae	Herb	Whole plant	Stop bleeding and wound healing
49.	*Mimosa pudica* L.	Lajjaboti	Khrapaing	Mimosaceae	Shrub	Whole plant	Abscess, filaria, measles, pyorrhea and hydrocele
50.	*Molineria recurvata* (Dryand.)	Satipata	Oli fahok	Liliaceae	Herb	Leaf and root	Stop bleeding and fracture bone
51.	*Ocimum americanum* L.	Bon tulsi	Nung aprou	Lamiaceae	Herb	Leaf	Bronchitis, abdominal pain and nose bleeding
52.	*Ocimum tenuiflorum* L.	Kalo tulsi	Nung gri	Lamiaceae	Shrub	Leaf	Cold, cough, influenza and gastric
53.	*Oroxylum indicum* (L.) Kurz	Khona	Khron sha mi	Bignoniaceae	Tree	Bark and leaf	Headache, body pain, hydrocele, jaundice and tonsillitis
54.	*Paederia foetida* L.	Gandha-bhaduli	Khebang way	Rubiaceae	Climber	Leaf	Stomach disorder, constipation, urticaria, anklitis and gout
55.	*Peperomia pellucida* (L.) H. B. & K.	Luchipata	Fopang pang	Piperaceae	Herb	Whole plant	Allergy, boils, eye inflammation and insect stings
56.	*Persicaria hydropiper* (L.) Spach	Biskatali	Oak tong	Polygonaceae	Herb	Leaf	Joint pain, carbuncles and stomach pain
57.	*Phyllanthus emblica* L.	Amloki	Chacabang	Euphorbiaceae	Tree	Fruit	Anorexia, dyspepsia, flatulence and hair fall

Table 1. Contd.

Sl. No.	Scientific name	Vernacular Name	Marma Name	Family	Habit	Plant parts used	Ailments
58.	*Phyllanthus reticulatus* Poir.	Chitki	Ghung-nel	Euphorbiaceae	Shrub	Leaf and root	Boils, diabetes and malaria,
59.	*Physalis minima* L	Fotka	Pholaopa	Solanaceae	Herb	Whole plant	Easy delivery and insomnia
60.	*Piper longum* L.	Pepul	Shin mang thui	Piperaceae	Climber	Leaf and fruit	Breast pain, body pain, delivery pain and chronic bronchitis
61.	*Plumbago zeylanica* L.	Shet chita	Kain kawk	Plumbaginaceae	Shrub	Leaf and root	Piles, blood dysentery, contraception and irregular menstruation
62.	*Pueraria tuberosa* (Roxb. *ex* Willd.) DC.	Botrajineem	Yang thrih	Fabaceae	Climber	Leaf and flower	Stop bleeding and leprosy
63.	*Rauvolfia serpentina* (L.) Benth. *ex* Kurz.	Sarpagandha	Bhomaraja	Apocynaceae	Shrub	Leaf and root	Hypertension, constipation, swollen of body and schizophrenia
64.	*Ricinus communis* L.	Bherenda	Crakchu	Euphorbiaceae	Shrub	Leaf and seed oil	Constipation, anal fistula, chest pain and mental disorder
65.	*Saraca asoca* (Roxb.) Willd	Ashok	Prajok	Fabaceae	Tree	Bark, leaf and flower	Dysmenorrhea, irregular menstruation, stomachache and dysentery
66.	*Scoparia dulcis* L.	Bandhane	Young boi pru	Scrophulariaceae	Herb	Whole plant	Breast pain, gallstone, earache and jaundice
67.	*Senna alata* (L.) Roxb.	Dadmardhan	Pouchibang	Caesalpiniaceae	Shrub	Leaf	Ringworm, eczema, hookworm and constipation
68.	*Senna tora* (L.) Roxb.	Chakunda	Dang geya	Caesalpiniaceae	Shrub	Leaf	Insanity, cough, eczema and ringworm
69.	*Sida rhombifolia* L.	Lal berela	Preduang lulang	Malvaceae	Shrub	Leaf and root	Pain, quick delivery, burning urination and carbuncle
70.	*Solanum torvum* Swartz.	Tit begun	Kharaing	Solanaceae	Shrub	Root and leaf	Hemorrhage, ear pain, leucorrhoea and tonsillitis
71.	*Spilanthes calva* DC.	Marhatinga	Hangfui	Asteraceae	Herb	Leaf	Knee pain, epilepsy, allergy and snake bite
72.	*Staurogyne argentea* Wall.	Chemdima	Rmbung	Acanthaceae	Herb	Leaf	Jaundice, cancer, gout and body pain
73.	*Sterculia villosa* Roxb. *ex* smith	Udal	Deudal	Sterculiaceae	Tree	Leaf	Burning urination, obesity and impotency
74.	*Suregada multiflora* (A. Juss.) Baill	Maricha	Fa choin da	Euphorbiaceae	Tree	Leaf and root	Rheumatism, pneumonia, cough and fever
75.	*Synedrella nodiflora* (L.) Gaertn.	Relanodi	Hanphui	Asteraceae	Herb	Leaf	Eczema, urticaria and stomachache
76.	*Terminalia chebula* Retz.	Horitaki	Ajubang	Combretaceae	Tree	Fruit	Leucoderma, constipation, ulcer, flatulence, enlarged spleen and diarrhea

Table 1. Contd.

Sl. No.	Scientific name	Vernacular Name	Marma Name	Family	Habit	Plant parts used	Ailments
77.	*Thunbergia grandiflora* (Roxb. *ex* Rottler)	Neel lata	Gain dhaya	Acanthaceae	Climber	Leaf	Leucorrhoea, treat swollen of the body, eye diseases and hysteria
78.	*Vitex negundo* L.	Nishinda	Thoaibai gach	Verbenaceae	Tree	Leaf	Abdominal pain, black fever, headache, cough and asthma
79.	*Woodfordia fruticosa* (L.) Kurz.	Dhaiphul	Se be gra	Lythraceae	Tree	Flower	Skin diseases, diarrhea, dysentery and stop bleeding
80.	*Xanthosoma violaceum* Schott	Dudhkachu	Prinme	Araceae	Herb	Rhizome and leaf	Stop bleeding, rheumatic pain and itchy skin
81.	*Zingiber montanum* (Koen.) Dietrich.	Bon ada	Playu	Zingiberaceae	Herb	Rhizome	Gastric, stomachache, constipation and amenorrhea

To treat different diseases, the most common formulations were prescribed as juice (38%), followed by paste (29%), decoction (16%), pills (9%), powder (5%), curry (2%) and infusion (1%) (Fig. 4). Conforming to Nadembega *et al*. (2011) in traditional herbal drugs, decoction can be considered one of the common forms of herbal formulations because it is very easy to prepare ethnomedicine simply by mixing plant parts with boiling water. Nonetheless, herbal healers of Rowangchhari upazila mostly practiced juice extraction formulations. It is conceivably due to their local adaptation to the harsh situation of Rowangchhari upazila and the tradition they inherited from their predecessor.

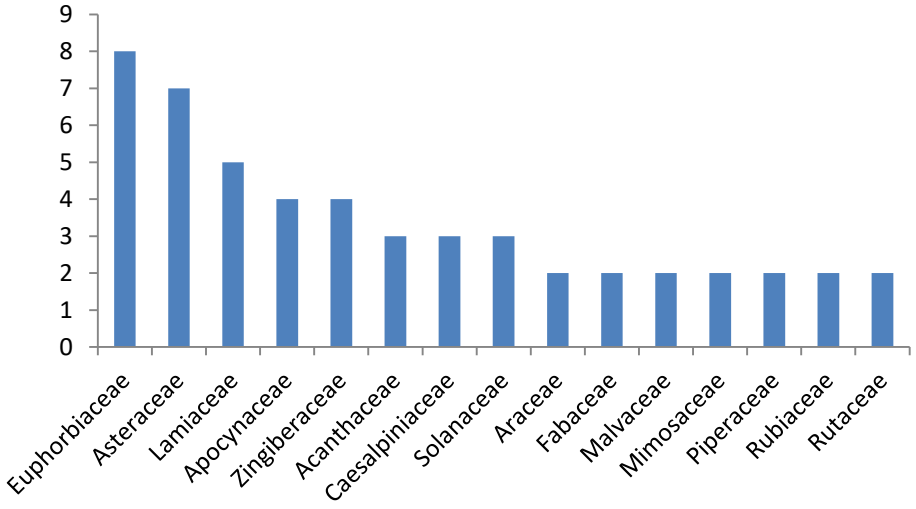

Fig. 1. Ethno medicinal plant species distribution among the dominant 15 family

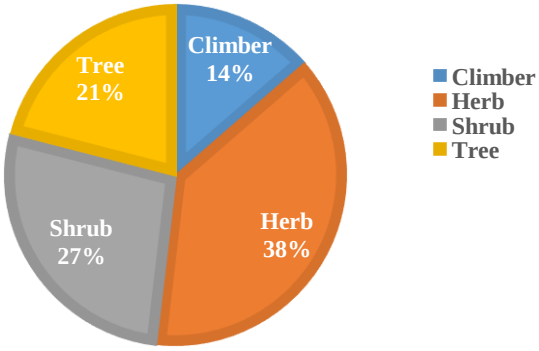

Fig. 2. Habit-wise classification of ethno medicinal plants used by the Marma Community

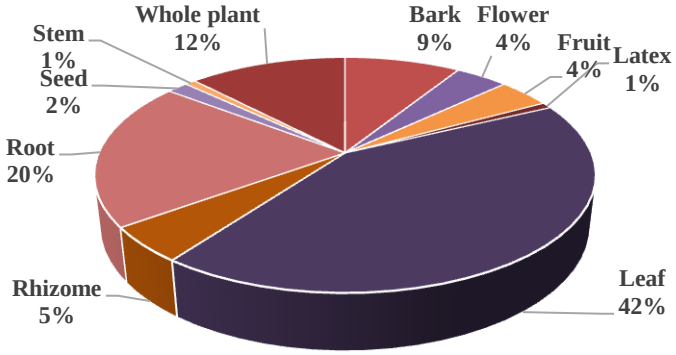

Fig. 3. Percentage of use of plant parts used by the Marma community

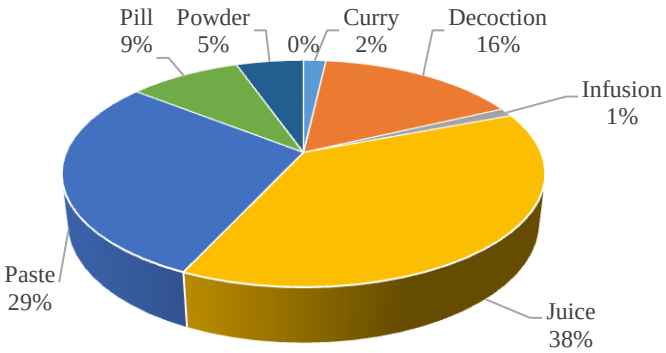

Fig. 4. Modes of providing herbal treatment by the Marma community

A total of 99 diseases or symptoms that were treated by the herbal practitioner were recorded from this study and it was found that skin diseases were treated by most of

the plants (13) followed by cough and fever (11), gastritis (10), constipation, dysentery, Jaundice and stomachache (8 each), body pain, gynecological complexity, headache and rheumatism (7 each), abdominal pain, bleeding and boils (6 each), asthma, gout, hydrocele, mental disorder and tonsillitis (5 each) (Fig. 5). It was reported that *Myrtus communis* was used for dysentery, rheumatism, hemorrhages, diarrhea, gastric ulcer and vomiting (Sumbul *et al.*, 2011). The fruit of *Foeniculum vulgare* was used for diabetes, renal diseases, stomach problems, and hypertension (Jouad *et al.*, 2001). Abe and Ohtani (2013) reported in their study that *Solanum nigrum* is used for the management of hypertension. The ethno medicinal importance of *Agave bracteosa* for breathing problems in children and treating mouth ulcers was discussed by Uniyal *et al.*, (2006). The aerial parts of *Artemisia vulgaris*, a member of family Asteraceae is used for the treatment of diabetes (Qureshi *et al*., 2007). Dulla and Jahan (2017) reported that the entire plant of *Cynodon dactylon* is used to treat tuberculosis and diabetes.

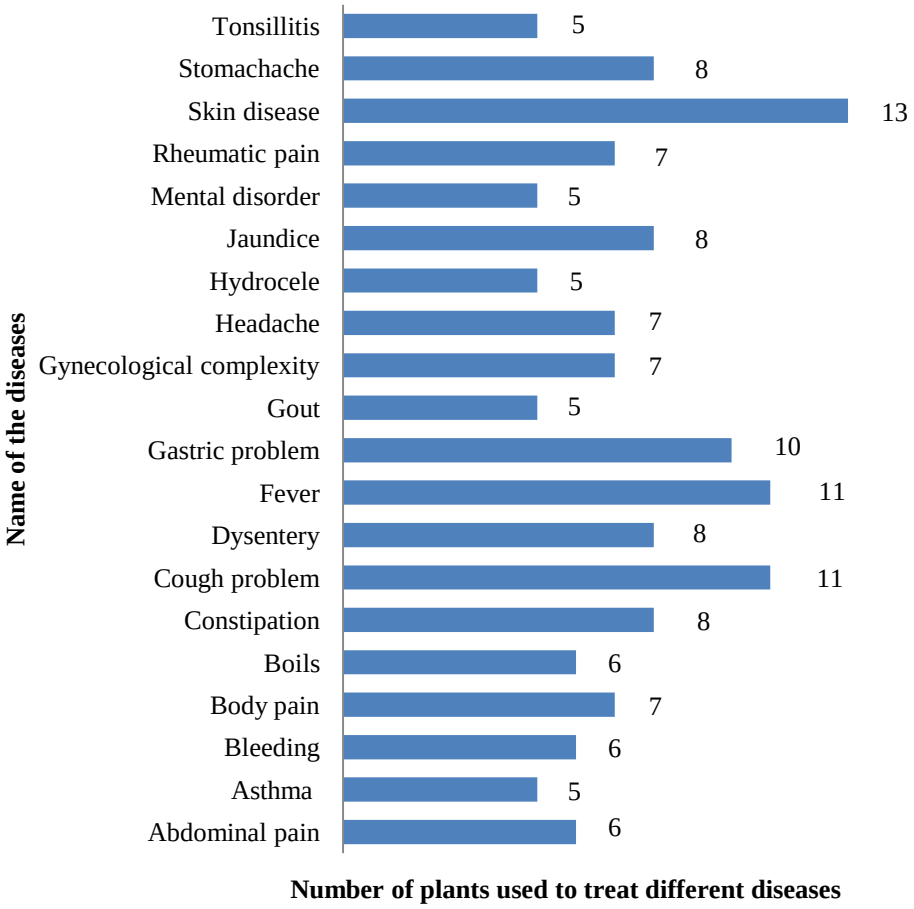

Fig. 5. Number of plants with different ethno medicinal actions (Diseases that used five and above number of plants)

Conclusion

The study revealed that the study area has a great biodiversity with a variety of medicinal plants and still needs more exploration. The local people of the Rowangchhari upazila widely used medicinal plants to treat various human ailments. The usage of these medicinal plants as remedies should be based more on modern scientific study. It is important to take the necessary steps to train the local Baiddays. The study should be expanded to other tribal communities in the Bandarban Hill District in order to identify any previously unknown medicinal plants that have been used for centuries to treat a variety of difficult conditions.

Acknowledgement

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Conflicts of Interest

The authors declare no conflicts of interest regarding publication of this paper.

References

Abe, R. and K. Ohtani. 2013. An ethno botanical study of medicinal plants and traditional therapies on Batan Island, the Philippines. *J. Ethnopharmacol*. 145(2):554–565.

Alam, M.K. 1992. Medicinal ethno botany of the Marma tribe of Bangladesh. *Economic Bot*. 46(3):330-335.

Balick, J.M. and P.A. Cox. 1996. Plants, People and Culture: The Science of Ethno botany. Scientific American Library, New York. p.228.

Baydoun, S., L. Chalak, D. Helena and A.N. Apostolides. 2015. Ethno pharmacological Survey of Medicinal Plants Used in Traditional Medicine by the Communities of Mount Hermon, Lebanon. *J. ethnopharmacol*. 173:139-156.

BBS (Bangladesh Bureau of Statistics). 2011. Statistical Year Book of Bangladesh, Ministry of Planning, Government of the Peoples' Republic of Bangladesh.

Behera, K.K. 2006. Ethnomedicinal Plants used by the tribals of similipal bioreserve Orissa, India: A Pilot Study. *Ethnobot. leafl.*10:149-173.

Biswas, K.R., T. Khan, M.N. Monalisa, A. Swarna, T. Ishika, M. Rahman and M. Rahmatullah. 2011. Medicinal plant used by folk medicinal practitioner of four adjoining village of Narail and Jessore district, Bangladesh. *Am.-Eurasian J. Sustain. Agric*. 5(1): 23-33.

Dulla, O and F.I. Jahan. 2017. Ethnopharmacological survey on traditional medicinal plants at Kalaroa Upazila, Satkhira District, Khulna Division, Bangladesh. *J. Intercult Ethnopharmacol*. 6(3):316–325.

Esha, R.T., M.R. Chowdhury, S. Adhikary, K.M.A. Haque, M. Acharjee, M. Nurunnnabi and Z. Khatun. 2012. Medicinal plants used by tribal medicinal practitioners of three clans of the chakma tribe residing in Rangamati district, Bangladesh. *Am. - Eurasian J. Sustain. Agric*. 6(2):74-84.

Ghiselin, M. and J. Landa. 2005. The economics and bio economics of folk and scientific classification. *J. Bioecon*. 7(3):221-238.

Ghorbani, A. 2005. Studies on pharmaceutical ethnobotany in the region of Turkmen Sahara, North of Iran: (part 1): general results. *J. Ethnopharmacol*. 102(1):58-68.

Giday, M., Z. Asfaw, T. Elmqvist and Z. Woldu. 2003. An ethnobotanical study of medicinal plants used by the Zay people in Ethopia. *J. Ethnopharmacol*. 85(1):43-52.

Hamayun, M., M.A. Khan and S. Begum. 2003. Marketing of medicinal plants of Utror-Gabral Valleys, Swat. Pakistan. *J. Ethnobot.* Leaflets. SIUC USA.

Hanif, A., M. S. Hossan, M.M.K. Mia, M.J. Islam, R. Jahan and M. Rahmatullah. 2009. Ethnobotanical survey of the Rakhain tribe inhabiting the Chittagong Hill Tracts region of Bangladesh. *Am. - Eurasian J. Sustain. Agric*. 3 (2):172-180.

Jouad, H., M. Haloui, H. Rhiouani, J. Hilaly and M. Eddouks. 2001. Ethnobotanical survey of medicinal plants used for the treatment of diabetes, cardiac and renal dis-eases in the North centre region of Morocco (Fez–Boulemane). *J. Ethnopharmacol*. 77(2-3):175–182.

Khisha, T., R. Karim, S.R. Chowdhury and R. Banoo. 2012. Ethnomedical Studies of Chakma Communities of Chittagong Hill Tracts, Bangladesh. *Bangladesh J. Pharmacol*. 15(1):59-67.

Mohiuddin, M., M.K. Alam, S.R. Basak and M.K. Hossain. 2012. Ethno-medico Botanical Study among the Four Indigenous Communities of Bandarban, Bangladesh, *Bangladesh J. Plant Taxon*. 19(1): 45-53.

Motaleb, M.A., M.K. Hossain, M.K. Alam, M.M.A.A. Mamun and M. Sultana. 2013. Commonly used Medicinal Herbs and Shrubs by Traditional Herbal Practitioners: Glimpses from Thanchi upazila of Bandarban. IUCN (International Union for Conservation of Nature), Dhaka, Bangladesh. i-xii 294.

Nadembega, P., J.I. Boussin, J.B. Nikiema, F. Poli and F. Antognoni. 2011. Medicinal plants in Baskoure, Kourittenga Province, Burkina Faso: an ethnobotanical study. *J. Ethnopharmacol*. 133 (2):378-395.

Qureshi, R.A., M.A. Ghufran, S.A. Gilani, K. Sultana and M. Ashraf. 2007. Ethnobotanical studies of selected medicinal plants of Sudhan Gali and Ganga Chotti hills, District Bagh, Azad Kashmir. *Pak. J. Bot*. 39 (7):2275–2283.

Rahman, M.A. 2010. Indigenous Knowledge of Herbal Medicines in Bangladesh: Treatment of Skin Diseases by Tribal Communities of the Hill Tracts Districts. *Bangladesh J. Botany.* 39 (2): 169-177.

Rahman, M.A., S.B. Uddin and C.C. Wilcock. 2007. Medicinal Plants used by Chakma Tribe in Hill Tracts Districts of Bangladesh. *Indian J. Tradit. Knowl*. 6(3):508-517.

Rahmatullah, M., A.H. Mollik, M. Ali, B. Abbas, R. Jahan, A. Khatun, S. Seraj and S. Ahsan. 2010. An Ethnomedicinal survey of Vitbilia Village in Sujanagar Sub-District, Bangladesh. *Am. - Eurasian J. Sustain. Agric*. 4(3):302-308.

Rahmatullah, M., P. Chakma, A.K. Paul, D. Nasrin, R. Ahmed, F. Jamal, D. Ferdausi, M. Akber, N. Nahar, S. Ahsan and R. Jahan. 2011. A survey of preventive medicinal plants used by the Chakma residents of Hatimara (south) village of Rangamati district, Bangladesh. *Am.- Eurasian J. Sustain. Agric*. 5(1):92-96.

Sarker, B., F. Akther, U. Ayman, R. Sifa, I. Jahan, M. Sarker, S.K. Chakma, P.K. Podder, Z. Khatun and M. Rahmatullah. 2012. Ethnomedicinal investigations among the Sigibe clan

of the Khumi tribe of Thanchi sub-district in Bandarban district of Bangladesh. *Am.-Eurasian J. Sustain. Agric*. 6(4):378- 386.

Senthilkumar, K., V. Aravindhan and A. Rajendran. 2013. Ethnobotanical Survey of Medicinal Plants Used by Malayali Tribes in Yercaud Hills of Eastern Ghats, *Indian J. Nat. Remedies.* 13(2):118-132.

Sumbul, S., M.A. Ahmed, M. Asif and M. Akhtar. 2011. *Myrtus communis* Linn - A review. *Indian J. Nat. Products and Resources*. 2(4):395–402.

Tugume, P., E.K. Kakudidi, M. Buyinza, J. Namaalwa, M. Kamatenesi, P. Mucunguzi *et al*. 2016. Ethnobotanical survey of medicinal plant species used by communities around Mabira Central Forest Reserve, Uganda. *J. Ethnobiol. Ethnomedicine*. 12(5):1-28.

Uddin, S.N., M. Z. Uddin, M.A. Hassan and M.M. Rahman. 2004. Preliminary ethnomedical plant survey in Khagrachari district, Bangladesh. *Bangladesh J. Plant Taxon*. 11(2): 39-48.

Uniyal, S.K., K.N. Singh, P. Jamwal and B. Lal. 2006. Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya. *J. Ethnobiol. Ethnomedicine*. 2(1):14.

Yusuf, M., M.A. Wahab, J.U. Chowdhury and J. Begum. 2006. Ethno-medico-botanical Knowledge from Kaukhali Proper and Betbunia of Rangamati District. *Bangladesh J. Plant Taxon*. 13(1):55-61.

Yusuf, M., M.A. Wahab, J.U. Chowdhury and J. Begum. 2007. Some Tribal Medicinal Plants of Chittagong Hill Tracts, Bangladesh, *Bangladesh J. Plant Taxon*. 14(2):117-128.