

ETHNOMEDICINAL PLANTS AND TRADITIONAL KNOWLEDGE AMONG LOCAL PEOPLE OF SHERPUR SADAR AND SREEBARDI UPAZILAS OF SHERPUR DISTRICT, BANGLADESH

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Abstract

An ethnomedicinal investigation was carried out in Sherpur Sadar and Sreebardi upazilas of Sherpur district to record, and document the traditional knowledge alongside with determining the consensus factor, citation frequency and fidelity level among the folklore medicinal practitioners. A total 51 plant species belonging to 49 genera and 38 families were cited with their mode of application for treating different ailments. The most frequently used plant species were represented by herbs (35.94%) followed by trees (33.33%), shrubs (19.61) and climbers (11.76). Leaves were found to be the most utilized part (50%) followed by root (14%), fruit (10%), flower (10%), stem (10%), bark (4%) and seed (2%). The reported ailments were categorized into 14 diseases and the maximum species were employed to treat digestive and gastrointestinal disorders. Leaves of *Eclipta alba* (L.) Hassk. are used in treatment of cataract without applying in eyes at the initial stage which is the first report for Bangladesh, and this species could be further screened for bioactive compound which can lead to discovery of new and potential drugs. Many species reported in the current study were found to be very rare which need to be conserved to maximize the sustainable uses of these vital resources in the study area.

Introduction

Ethnomedicine refers to traditional medicine practiced by various ethnic communities, and the origin over 50% of all pharmaceutical drugs could be traced back to ethnomedicine (Van Wyk *et al.*, 1997). Many studies have shown that 80% of people in developing countries depend on traditional medicine for their basic primary health care (Faruque and Uddin, 2014; Getu *et al.*, 2015; Hanako and Tsurho, 2016; Rajamurugan *et al.*, 2016). According to WHO, about 80% of the world's population, mostly the rural people of developing countries still primarily rely on traditional medicines (WHO, 2001). The global herbal medicine market size was estimated to be US\$ 83 billion in 2019 and is expected to reach US\$ 550 billion by 2030 (<https://www.insightslice.com/herbal-medicine-market>). Currently, this market for medicinal plants and plant products has been rising day by day because of easy availability, effectiveness in chronic diseases, less side effects, and cost effective. The Conference of Parties (COP) gathered in Rio de Janeiro, Brazil in 1992 with the Agenda 21 in order to formulate biodiversity conservation policy that gave emphasis on the documentation and sustainable utilization of traditional knowledge of medicinal plants.

Bangladesh is richly endowed with floral diversity and it has been estimated that more than 5,000 angiosperm species exist in the country (Rahman, 2020). The traditional medicinal practices have long been in use in Bangladesh like Ayurveda, Unani, folk medicine and home remedies, all

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of which utilize plants to a major extent for treatment (Ghani, 2003). Several studies on ethnobotanical and ethnomedicinal plants were carried out to document the traditional knowledge in different parts and among different ethnic communities in Bangladesh (Hassan and Khan, 1986, 1996; Mia and Huq, 1988; Alam *et al.*, 1996; Uddin M.Z. *et al.*, 2006, 2008, 2012, 2015, 2017; Yusuf *et al.*, 2002, 2006; Uddin S.N. *et al.*, 2004; Uddin S.B. *et al.*, 2011; Sajib and Uddin, 2013; Rahman, 2013; Ferdoushi *et al.*, 2016; Kona and Rahman, 2016; Hossain and Rahman, 2018; Khatun and Rahman, 2018). However, no any ethnobotanical study was carried out in Sherpur Sadar and Sreebardi upazilas under Sherpur district. Therefore, the present study aims at recording, integrating and documenting the traditional knowledge of ethnomedicinal species as well as to determine the informant consensus factor, fidelity level and citation frequency of the plants in Sherpur Sadar and Sreebardi upazilas of Sherpur district.

Materials and Methods

Study area:

Sherpur Sadar upazila is located at 24°55' to 25°06' N latitudes and 89°53' to 90°07' E longitudes with an area of 356.12 sq. km. and consists of 14 unions. It is bounded by Sreebardi, Jhenaigati and Nalitabari upazilas on the north, Jamalpur Sadar upazila on the south, Nakla upazila on the east, Islampur and Melandaha upazilas on the west. Sreebardi upazila is situated in 25°03' to 25°18' N latitudes and 89°53' to 90°03' E longitudes with an area of 270.34 sq. km. and comprises 10 unions (Fig. 1). The annual average temperature of Sherpur district ranges from 12°C to 33.3°C, while the annual rainfall is 2174 mm (BBS, 2011). Garo Hill tract also known as Shalbon is present in this district where mainly Garo tribal people live along with local people. Luxuriant growth of seasonal herbs, aquatics and climbers were observed in this area during growing season. Some native tree species were also found in Sherpur Sadar and Sreebardi upazilas. A good number of people possess traditional botanical knowledge and they use such plant species in their primary health care management. The tribal people are mainly dependent on plants for their ailments.

Plant samples and data collection:

Plant specimens were collected from the study areas during field survey from July 2019 to December 2020. The specimens were critically studied and identified by experts and using standard literature and online databases (Ahmed *et al.*, 2008-2009; The Plant List 2013; TROPICOS, 2018). The voucher specimens of the medicinal plants were prepared following standard herbarium protocol (Alexiades, 1996) and were deposited at Dhaka University Salar Khan Herbarium (DUSH). Data were collated through semi-structured questionnaires (Alexiades, 1996). Authentic informants were interviewed independently from 54 informants, of which 29 were women and 25 men of 23 to 95 years of ages. The respondents provided plant names, parts used, mode of application and the disease to be treated.

Data analyses:

Factor of informant consensus (Fic): In order to estimate the use diversity of the medicinal plants, Factor of informant consensus (Fic) was calculated using the following formula:

$$Fic = \frac{N_{ur} - N_{taxa}}{N_{ur} - 1}$$

Where, N_{ur} denotes the number of use reports in each category and N_{taxa} refers the number of species in each category (Heinrich *et al.*, 1998).

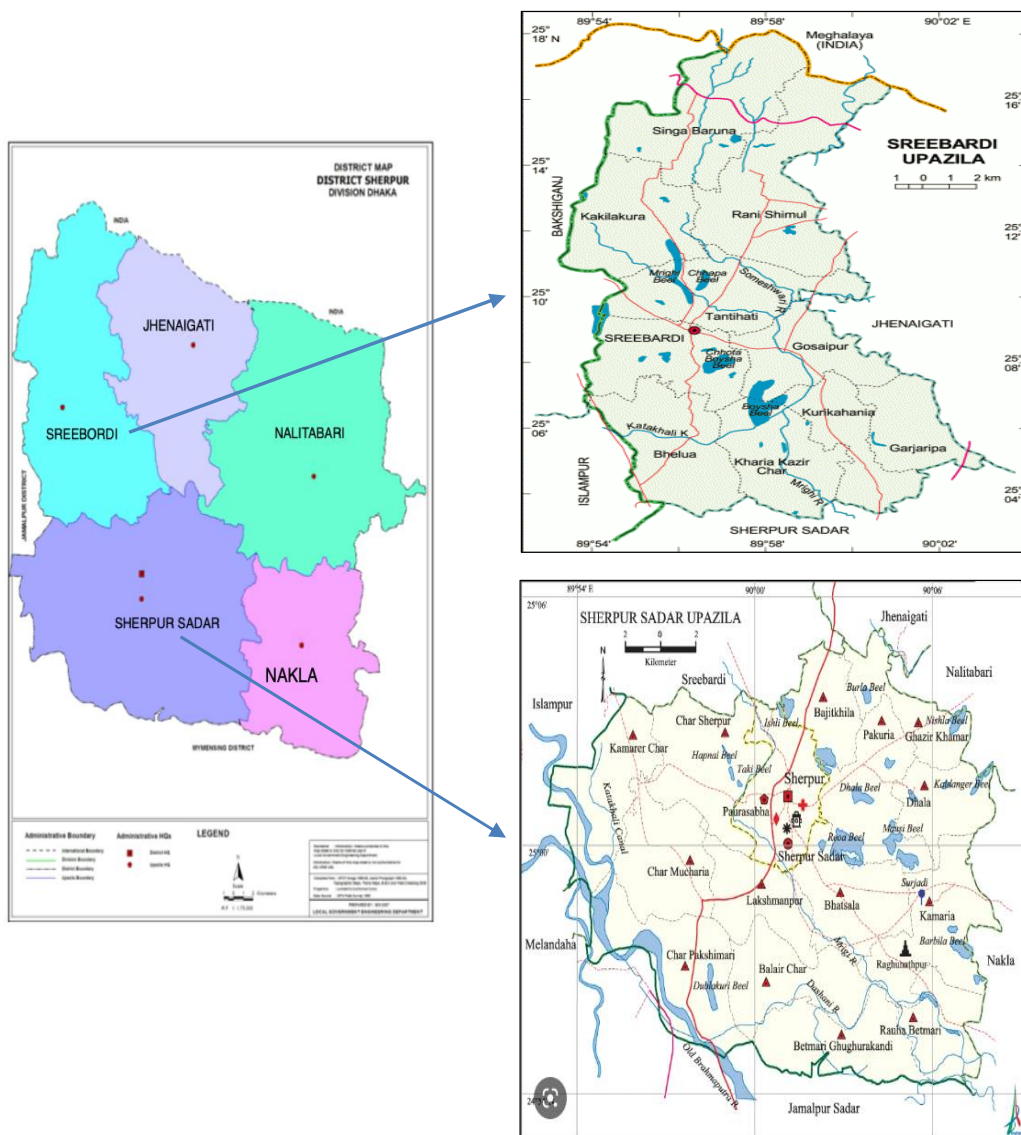


Fig. 1. Maps showing the study area Sherpur Sadar and Sreebardi upazilas of Sherpur district.

Citation frequency (Cf%): CF values were estimated using the formula:

$$\text{Citation frequency (Cf \%)} = \frac{nc}{N} \times 100$$

Where, n is the number of people interviewed citing species and N denotes total number of people interviewed (Friedman *et al.*, 1986).

Fidelity level (FI%): The fidelity level value is useful for identifying the informants' most preferred species in use for treating certain ailments. FI value was computed using the following formula:

$$\text{Fidelity level (FI \%)} = \frac{I_p}{I_u} \times 100$$

Where I_p is number of informants who indicate use of a species for the same major ailment, I_u is the total number of informants who mentioned the same plant for any other use (Friedman *et al.*, 1986). Medicinal plants that are widely used by the local people for a particular ailment have higher FI values than those which are less popular.

Results and Discussion

The present study has revealed a total of 51 medicinal plant species belonging to 47 genera and 38 families with 60 formularies for treating different ailments indicating that there is rich diversity of ethnomedicinal plants with different uses in the study areas. For each species, updated nomenclature with authority, family names, local name, parts used, diseases to be treated, mode of treatment and voucher numbers have been provided (Table 1). The study depicts that local people and folk medicinal practitioners of the study areas have a rich traditional knowledge about medicinal plants that has been inherited from generation to generation. Moreover, the present investigation has displayed that people of Sherpur Sadar and Sreebardi upazilas emphasize on using medicinal plants with a discovery of application method. However, the traditional medical practitioners from study area were not much aware in conserving medicinal plants and local people are not also aware to conserve the plants used for sustainable uses.

Among the species investigated, the most frequently used species are herbs (35.94%) followed by trees (33.33%), shrubs (19.61) and climbers (11.76) (Fig. 2). The study revealed that out of all formularies, 72.13% was of internal application and the remaining 27.87% was of external application (Fig. 3). Leaves were found to be the most utilized plant part (50%) followed by root (14%), fruit (10%), flower (10%), stem (10%), bark (4%) and seed (2%) (Fig. 4).

Factor of informant consensus:

The Factor of informant consensus (Fic) model was used to determine the use diversity of medicinal plants and to identify the ethnopharmacologically important plant species (Heinrich *et al.*, 1998). The Fic values among the investigated species varied from 0.840 to 1 (Table 2). The highest Fic value 1 was found in the cases of anthelmintic, jaundice, bone fracture and kidney stone, and the cited species for treating the species are *Ananas comosus*, *Saccharum officinarum*, *Cissus quadrangularis* and *Kalanchoe pinnata*, respectively. In case of the second highest Fic value category disease i.e. respiratory diseases, the most cited species is *Justicia adhatoda*.

The use of *Ananas comosus* as anthelmintic as revealed from the study was found in the same line with that of Kadir *et al.* (2012), *Saccharum officinarum* applied for treating jaundice was found to be consistent with Rahim *et al.* (2012), *Cissus quadrangularis* in bone fracture was found similar to Ramachandran *et al.* (2021), and administration of *Kalanchoe pinnata* against Kidney stone was found consistent with Islam and Uddin (2022).

Fidelity level:

The current investigation displayed 100% fidelity level (FI) in *Litsea glutinosa*, *Azadirachta indica*, *Justicia adhatoda*, *Zingiber officinale*, *Terminalia arjuna*, *Aloe vera*, *Aegle marmelos*, *Allium sativum*, *Tinospora crispa* and *Clerodendrum viscosum* against dysentery, body pain, phlegm-catarrh, gastrointestinal problems, cardiovascular disease, hypertension and fever,

Table 1. List of Medicinal plants in Sherpur Sadar and Sreebardi upazila with diseases to be treated and mode of administration.

Species and voucher	Local name	Parts used	Diseases to be treated	Mode of application
<i>Aegle marmelos</i> (L.) Corr. Fam.: Rutaceae; LS 01 (DUSH)	Bel	Fruit	Dysentery	Overnight soaked dried slice of tender fresh fruit is taken in the morning for a week. Tea made from the soaked water with 1-2 leaves for 7 days is taken. Juice of fresh fruit is taken twice a day for 4-5 days.
<i>Allium sativum</i> L. Fam.: Liliaceae; LS 02 (DUSH)	Roshun	Cloves	Hypertension and cancer	Raw cloves are eaten daily in the morning in empty stomach.
<i>Aloe vera</i> (L.) Burm. f. Fam.: Aloeaceae; LS 03 (DUSH)	Gritokumari	Pulp of leaves	Lower abdominal problem	Leaf pulp with half glass of water is eaten regularly.
<i>Amaranthus spinosus</i> L. Fam.: Amaranthaceae; LS 04 (DUSH)	Khoirakata	Root	Boil	After rubbing the boil gently with slight warm water using cotton, root paste is applied on it until recovery.
<i>Ananas comosus</i> (L.) Merr. Fam.: Bromeliaceae; LS 05 (DUSH)	Anarosh	Young leaves	Anthelmintic	One table spoon of white portion of tender leaves with juice of fresh turmeric and 1-2 drops of lime (CaO) is eaten for 2 days in a month.
<i>Andrographis paniculata</i> (Burm f.) Wall ex. Nees Fam.: Acanthaceae; LS 06 (DUSH)	Kalomegh (Chirata)	Leaves	Body pain and fever	1 table spoon of leaf juice is taken in the morning once a day for 7 days
<i>Azadirachta indica</i> A. Juss. Fam.: Meliaceae; LS 07 (DUSH)	Neem	Leaves	Body pain	Two pills made from neem leaf is taken daily for 10-15 days.
<i>Calotropis gigantea</i> (L.) W.T. Aiton Fam.: Asclepiadaceae; LS 08 (DUSH)	Boro-akondo	leaves	Chest and back pain	The warm leaves are applied regularly on chest and back once a day after warming on old ghee until mitigation
<i>Carica papaya</i> L. Fam.: Caricaceae; LS 09 (DUSH)	Pepe	Leaves	Tinea	Leaf juice is applied on the infected portion daily until recovery.
<i>Centella asiatica</i> (L.) Urban Fam.: Apiaceae; LS 10 (DUSH)	Dhulmalik, Thankuni	Leaves	Ophthalmia Dysentery	1-2 drops leaf juice in eye is applied for 3-4 days. Leaf juice along with young stem of <i>Cynodon dactylon</i> is taken twice a day in a week.
<i>Citrus limon</i> (L.) Burm. f. Fam.: Rutaceae; LS 11 (DUSH)	Lebu	Fruit	Dandruff	Fruit juice is applied 2-3 days in a week on the scalp until recovery.
<i>Cissus quadrangularis</i> L. Fam.: Vitaceae; LS 12 (DUSH)	Harjoralata	Stem	Bone fracture	The paste of stem is applied on the fractured bone and is bound with the help of cloth or rope.

Species and voucher	Local name	Parts used	Diseases to be treated	Mode of application
<i>Clerodendrum viscosum</i> Vent. Fam.: Verbenaceae; LS 13 (DUSH)	Utom	Tinder leaves	Abdominal pain	Juice of 2 tender leaves is mixed with breast milk or with sugar and then is given to children.
<i>Coccinea cordifolia</i> (L.) Cogn. Fam.: Curcubitaceae; LS 14 (DUSH)	Telakucha	Leaves	Diabetes	Half cup of leaf juice with water is taken daily in the morning.
<i>Coix lacryma-jobi</i> L. Fam.: Poaceae; LS 15 (DUSH)	Kaoua-goda	Root	Dandruff	Leaf juice is applied on scalp thrice a week.
<i>Colocasia esculenta</i> (Linn.) Schott. Fam.: Araceae; LS 16 (DUSH)	Kochu	Leaves	Stomach problem	The root is tied on the waist until mitigation of problem.
<i>Dillenia indica</i> L. Fam.: Dilleniaceae; LS 17 (DUSH)	Chalta	Leaves	Migraine	One leaf with little salt is applied on forehead after smashing until mitigation of pain.
<i>Eclipta alba</i> (L.) Hassk. Fam.: Asteraceae; LS 18 (DUSH)	Keshraj	Leaves	Body weakness	2 table spoon of leaf juice is taken twice a day for one month.
		Whole plant	Gastric problem	Juice of whole plant along with <i>Cynodon dactylon</i> is taken in the morning in empty stomach for 5 days.
		Whole plant except root	Cataract	The smashed plant with little salt is rubbed from Neck up to waist in 3 days interval until the cataract disappears.
<i>Ficus hispida</i> Linn. Fam.: Moraceae; LS 19 (DUSH)	Kudura	Root	Internal fever	1 table spoon of plant juice along with raw turmeric juice is taken twice a day in a week.
<i>Ficus racemosa</i> L. Fam.: Moraceae; LS 20 (DUSH)	Jogdumur, Jobdongo	Fruit	Swelling body part	The root is tied on the left arm or at the waist until recovery.
<i>Ficus religiosa</i> L. Fam.: Moraceae; LS 21 (DUSH)	Pipul	Root	Constipation	Curry made from fruits is eaten daily until recovery
<i>Glycosmis arborea</i> (Retz.) DC. Fam.: Rutaceae; LS 22 (DUSH)	Shewra	Leaves	Tooth pain	Small piece of root is chewed once a day until mitigation.
<i>Helicteres isora</i> L. Fam.: Sterculiaceae; LS 23 (DUSH)	Hatti-ghora	Leaves	Mouth ulcer	2 leaves of are chewed daily until recovery.
<i>Hemidesmus indicus</i> (L.) R. Br. Fam.: Asclepiadaceae; LS 24 (DUSH)	Anantomul	Leaves	Black fever	1 teaspoon of leaf juice is taken once a day until recovery.
		Leaves	Ophthalmia	One drop of leaf juice mixed with one drop of leaf juice of <i>Centella asiatica</i> is applied until mitigation.
		Root	Blood problem	Juice of smashed root is given for one month (once a day).

Species and voucher	Local name	Parts used	Diseases to be treated	Mode of application
<i>Hibiscus rosa-sinensis</i> L. Fam.: Malvaceae; LS 25 (DUSH)	Roktojoba	Flower	Dysentery	Flower juice is given in empty stomach twice a day for 4-5 days.
<i>Justicia adhatoda</i> L. Fam.: Acanthaceae; LS 26 (DUSH)	Basak	Leaves	Phlegm-catarth	One table spoon of leaf juice is taken in the morning twice a day for one week.
<i>Justicia gendarussa</i> Burm. f. Fam.: Acanthaceae; LS 27 (DUSH)	Nokhkata	Leaves	To stop bleeding	4-5 smashed leaves are applied on the wound.
<i>Kalanchoe pinnata</i> (Lamk.) Pers. Fam.: Crassulaceae; LS 28 (DUSH)	Pathorkuchi	Leaves	Kidney stone	One teaspoon of leaf juice is taken 4-5 days in a month.
<i>Lens culinaris</i> Medik. Fam.: Fabaceae; LS 29 (DUSH)	Moshur dal	Seed	Dandruff	Overnight soaked water of lentil is applied 3-4 days in a week until recovery.
<i>Leucas lavandulifolia</i> Sm. Fam.: Lamiaceae; LS 30 (DUSH)	Dondokolosh	Leaves	Rheumatism	Cooked leaves after eaten 4-5 days in a month.
<i>Litsea glutinosa</i> (Lour.) Rob. Fam.: Lauraceae; LS 31 (DUSH)	Kharajora	Leaves	Weakness, gastrointestinal problems, fever	Leaf juice is taken in empty stomach twice a week for one month.
<i>Mangifera indica</i> Lamk. Fam.: Anacardiaceae; LS 32 (DUSH)	Aam	Peel of fruit	Body weakness	Juice of peel of fruit is taken daily in the morning in empty stomach for a month.
<i>Mimosa pudica</i> L. Fam.: Mimosaceae; LS 33 (DUSH)	Lojjaboti	Whole plant	Chicken pox	The smashed plant is taken by the uninfected people as a preventive agent.
<i>Moringa oleifera</i> Lamk. Fam.: Moringaceae; LS 34 (DUSH)	Shojna, hasina	Leaves	Cancer, leukaemia	Leaf juice is taken 3 times a day till the body regains its immunity.
<i>Musa sapientum</i> L. Fam.: Musaceae; LS 35 (DUSH)	Kola	Banana Flower	Diabetes	Curry of banana flower is eaten 2-3 days in a week.
<i>Neolamarckia cadamba</i> (Roxb.) Bosser Fam.: Rubiaceae; LS 36 (DUSH)	Kodom	Flower bud	Gastric trouble	Bud with a pinch of salt is eaten every morning for 3 days.
<i>Peperomia pallucida</i> (L.) Kunth Fam.: Peperomiaceae; LS 37 (DUSH)	Luchipata	Leaves	Tinea or ringworm	Juice of some leaves applied on the infected portion 3-4 days in a week until recovery.
<i>Piper betel</i> L. Fam.: Piperaceae; LS 38 (DUSH)	Paan	Leaf petiole	Burning of centipedes	Juice of petiole is applied on the burnt portion by centipede for 3 days.
<i>Phaseolus vulgaris</i> L. Fam.: Fabaceae; LS 39 (DUSH)	Shim	Leaves	Tinea	Smashed leaves with a pinch of salt are applied once a day until recovery.

Species and voucher	Local name	Parts used	Diseases to be treated	Mode of application
<i>Phyllanthus emblica</i> L. Fam.: Phyllanthaceae; LS 40 (DUSH)	Aamloki	Fruits	Dandruff	Fruit juice is applied on the scalp 20 minutes before shampoo.
<i>Punica granatum</i> L. Fam.: Puniceae; LS 41 (DUSH)	Dalim	Flower	Dysentery	Smashed flower along with seed of <i>Syzygium cumini</i> and one drop of lime is taken once a day for 3 days.
<i>Ricinus communis</i> L. Fam.: Euphorbiaceae; LS 42 (DUSH)	Venna, Verenda	Root	Rheumatism	Two teaspoon of root juice is taken 2-3 days in a week for 1 month.
<i>Saccharum officinarum</i> L. Fam.: Poaceae; LS 43 (DUSH)	kushari	Stem	Jaundice	One glass of stem juice is taken per day until recovery.
<i>Sida acuta</i> Burm. f. Fam.: Malvaceae; LS 44 (DUSH)	Bairoli	Leaves	Weakness	Two teaspoon of leaf juice in a cup of normal water is taken in empty stomach 4-5 days in a month.
<i>Solanum melongena</i> L. Fam.: Solanaceae; LS 45 (DUSH)	Begun	Young fruit	Gastric	One tablespoon of leaf juice is taken in empty stomach in the morning.
<i>Sweetenia mahagoni</i> (L.) Jacq. Fam.: Meliaceae; LS 46 (DUSH)	Mehogoni	Seed	Swelling of finger Diabetes	Empty shell of fruit after removing all inner material is inserted in the finger and bound with the help of hair and is kept for 1-2 days. Smashed seed with a little bit honey is taken 2-3 days in a week.
<i>Syzygium cumini</i> (L.) Skeel Fam.: Myrtaceae; LS 47 (DUSH)	Kalo jam	Bark	Dysentery	Overnight soaked water of bark is taken 2-3 days in a week.
<i>Terminalia arjuna</i> (Roxb.) W. & A. Fam.: Combretaceae; LS 48 (DUSH)	Arjun	Bark	Dysentery Heart disease, Diabetes, hypertension	Bark juice after smashing is taken for 4-5 days. Overnight soaked bark water is taken regularly in the morning.
<i>Tinospora crispa</i> (L.) Hook. f. & Thom. Fam.: Menispermaceae; LS 49 (DUSH)	Poddo- guloncho	Stem	Decreased appetite, fever Blood related problem, allergy	Two pills made from the cut dried stem is taken 3-4 days in a week (Twice a day). Overnight soaked bark water is taken in the morning for 15 days.
<i>Vitex negundo</i> L. Fam.: Verbenaceae; LS 50 (DUSH)	Nishinda	Leaves	Rheumatism	Leaf juice is taken empty stomach in the morning for one month.
<i>Zingiber officinale</i> Rose. Fam.: Zingiberaceae; LS 51 (DUSH)	Aada	Rhizome	Gastric problem	25g of rhizome is chewed with a pinch of salt in empty stomach in the morning.

respectively (Table 3). The higher FL value of a species indicates the prevalence of a specific disease in an area and the utilization of plant species by the inhabitants to treat that disease (Srithi *et al.*, 2009; Bibi *et al.*, 2014).

Table 2. Consensus of agreement on the uses of medicinal plants among informants.

No	Category of disease	Most cited plants	No. of use reports	No. of taxa	Fic
1	Digestive and Gastrointestinal diseases (Gastritis, diarrhea, dysentery, appetite, constipation)	<i>Litsea glutinosa</i>	165	15	0.915
2	Muscle and skeletal disorders (Swelling, wound, pain in body part, rheumatism, migraine, toothache)	<i>Azadirachta indica</i>	102	9	0.922
3	Dermatology (Tinea, dandruff, allergy,boil)	<i>Citrus limon</i>	87	11	0.884
4	Cardiovascular diseases (Heart problem, blood purifier, hypertension)	<i>Terminalia arjuna</i>	44	3	0.953
5	Fever (Normal fever, internal fever, black fever)	<i>Tinospora crispa</i>	26	5	0.840
6	Eye problems (Cataract, Ophthalmia)	<i>Eclipta alba</i>	26	3	0.920
7	Aesthenia (Body weakness)	<i>Litsea glutinosa</i>	42	7	0.853
8	Diabetes	<i>Syzygium cumini</i>	22	3	0.904
9	Cancer	<i>Moringa oleifera</i>	9	2	0.875
10	Respiratory diseases (Phlegm, Catarrh)	<i>Justicia adhatoda</i>	39	2	0.974
11	Anthelmintic	<i>Ananas comosus</i>	10	1	1
12	Jaundice	<i>Saccharum officinarum</i>	22	1	1
13	Bone fracture	<i>Cissus quadrangularis</i>	18	1	1
14	Kidney stone	<i>Kalanchoe pinnata</i>	17	1	1

■ Herb (35.94%) ■ Shrub (19.61%)
■ Tree (33.33%) ■ Climber (11.76%)

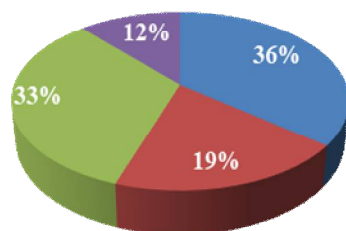


Fig. 2. Habit-wise categorization showing the percentage of species for treating different ailments.

■ External (27.87) ■ Internal (72.13)

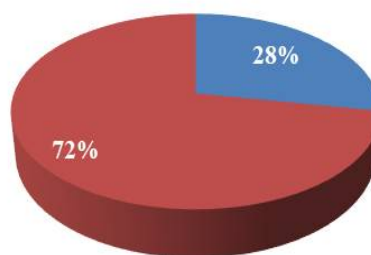


Fig. 3. Percentage of mode of administration of medicinal plants used by the local people of in the study area.

Citation frequency (Cf):

Citation frequency of some selected plant species are shown in the Table 4. *Litsea glutinosa* showed the highest Cf value (94.11) which indicated that this species is very commonly used in the study areas to treat dysentery followed by *Azadirachta indica*, *Zingiber officinale* and *Justicia adhatoda*. In contrast, the lowest citation frequency was found in *Allium sativum*.

In the current study, the most commonly cited mode of administration is in the form of juice followed by paste, crushed, decoction, powdered and chewed. Our results were found to be concordant with that of previous study (Uddin *et al.* 2017). The maximum informants preferred oral consumption of medicines instead of external application. This finding was also supported by several other (Uddin *et al.*, 2015; Faruque *et al.*, 2018; Islam and Uddin, 2022).

Table 3. Fidelity level (FI) values of frequently cited plant species and their major uses.

Ailments	Species	No. of Informants (Ip)	Total no. Informants (Iu)	% of Fidelity level (FI)
Dysentery	<i>Litsea glutinosa</i>	48	48	100
Body pain	<i>Azadirachta indica</i>	42	42	100
Phlegm-catarrh	<i>Justicia adhatoda</i>	37	37	100
Gastrointestinal problem	<i>Zingiber officinale</i>	41	41	100
Cardiovascular disease	<i>Terminalia arjuna</i>	31	31	100
Gastrointestinal problem	<i>Aloe vera</i>	25	25	100
Dysentery	<i>Aegle marmelos</i>	15	15	100
Hypertension	<i>Allium sativum</i>	13	13	100
Fever	<i>Tinospora crispa</i>	12	12	100
Abdominal pain	<i>Clerodendrum viscosum</i>	9	9	100
Diabetes	<i>Coccinea cordifolia</i>	17	25	68
Cancer	<i>Moringa oleifera</i>	5	13	60
Rheumatism	<i>Vitex negundo</i>	23	42	54.76
Cataract	<i>Eclipta alba</i>	13	25	52

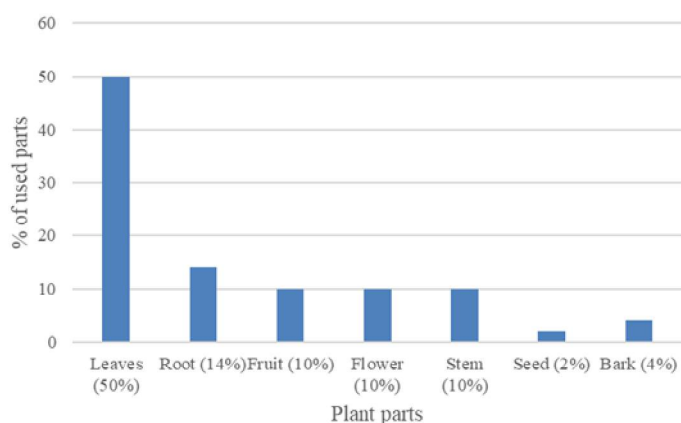


Fig. 4. Percentage of plant parts used for medicinal purposes by the local people in Shrrherpur and Sreebordi upazilas of Sherpur district.

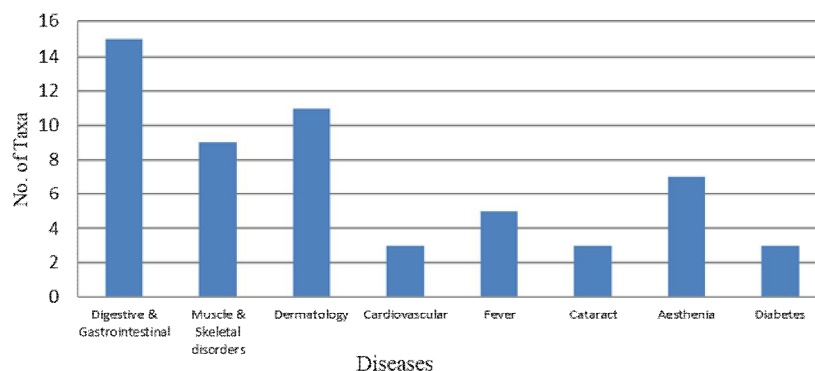


Fig. 5. Number of taxa used for treating major diseases by the local people in Shrrherpur and Sreebari upazilas of Sherpur district.

Table 4. Citation frequency of some selected medicinal plant species of the study area.

Species	Local name	Ailments	Citation	Citation frequency (CF %)
<i>Litsea glutinosa</i>	Kharajora	Dysentery	48	94.11
<i>Azadirachta indica</i>	Neem	Body pain	42	82.35
<i>Zingiber officinale</i>	Aada	Gastrointestinal problems	41	80.39
<i>Justicia adhatoda</i>	Basak	Phlegm-catarrh	37	72.55
<i>Terminalia arjuna</i>	Arjun	Cardiovascular	31	60.78
<i>Aloe vera</i>	Chokkoira gach	Gastrointestinal problem	25	49.02
<i>Allium sativum</i>	Roshun	Hypertension and cancer	13	25.49

The present study has revealed novel information regarding the uses of some species which are not found in previous studies carried out in different parts of Bangladesh (Uddin *et al.*, 2006, 2015, 2017; Sajib and Uddin, 2015; Nahar *et al.*, 2016; Sohel *et al.*, 2016; Yasmin and Rahman, 2017; Khatun and Rahman, 2018). A few of the noteworthy and novel findings include: *Eclipta alba* is reported for the first time to treat cataract, *Moringa oleifera* to treat cancer, *Ficus hispida* to reduce water from foot swelling of pregnant women, *Coccinea cordifolia* to treat extreme dandruff and *Coix lacryma-jobi* to treat stomach problems. From the present survey, some threats to the medicinal plant species have come in light including habitat destruction and fragmentation, deforestation, over-exploitation, lack of awareness for conserving the species diversity among local people and plantation of exotic species. According to local people, these species might possess threats to native ecosystem as no birds sit in these trees and no fish can survive in nearby ponds. To protect valuable medicinal plant species in the present study area, a number of protective measures should be undertaken i.e. nurseries should be developed for propagating important and threatened medicinal plants, distribution map with specific longitude and latitude for the important species to be generated, and *ex-situ* conservation strategies should be applied for conserving the medicinal plants in the study area for their sustainable uses and development. The species with the highest Fic value, fidelity level and citation frequency might be phytochemically screened for searching novel bioactive compounds. The study might unveil a new window for

drug discovery in future that will have a significant impact on socio-economic development and health sector of Bangladesh.

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References

- Ahmed, Z.U., Begum, Z.N.T., Hassan, M.A., Khondker, M., Kabir, S.M.H., Ahmad, M., Ahmed, A.T.A., Rahman, A.K.A. and Haque, E.U. (Eds) 2008-2009. Encyclopedia of Flora and Fauna of Bangladesh. Vols. **6-10**. Angiosperms: Dicotyledons (Acanthaceae-Asteraceae). Asiat. Soc. of Bangladesh, Dhaka.
- Alam, M.K., Choudhury, J. and Hassan, M.A. 1996. Some folk formularies from Bangladesh, Bangladesh J. Life Sci. **8**(1): 49-63.
- Alexiades, M.N., (Ed.) 1996. Selected Guidelines For Ethnobotanical Research: A Field Manual. The New York Botanical Garden, New York, 305 pp.
- BBS (Bangladesh Bureau of Statistics) 2011. Statistical Pocket Book Bangladesh 2011. Statistics and Informatics Division, Ministry of Planning, Government of the People's Republic of Bangladesh.
- Bibi, T., Ahmad, M., Tareen, R.B., Tareen, N.M., Jabeen, R. and Rehman, S. 2014. Ethnobotany of medicinal plants in district Mastung of Balochistan Province-Pakistan. J. Ethnopharmacol. **157**: 79-89.
- Faruque, M.O. and Uddin, S.B. 2014. Ethnomedicinal study of the Marma community of Bandarban district of Bangladesh. Academia J. Med. Plants **2**(2): 014-025.
- Faruque, M.O., Uddin, S.B., Barlow, J.W., Hu, S., Dong, S., Cai, Q., Li, X. and Hu, X. 2018. Quantitative ethnobotany of medicinal plants used by indigenous communities in the Bandarban district of Bangladesh. Front. Pharmacol. **9**: 40.
- Ferdoushi, A., Mahmud, S., Rana, M.M., Islam, M.S., Salauddin. A.S.A. and Hossain, F. 2016. A survey on medicinal plant usage by folk medicinal practitioners in different villages at Nalitabari upazilla, Sherpur district, Bangladesh. European J. Med. Plants **11**(3): 1-22.
- Friedman, J., Yaniv, Z., Dafni, A. and Palewitch, D. 1986. A preliminary classification of healing potential plants, based on a rational analysis of an ethno-pharmacological field survey among Bedouins in the Negev Desert, Israel. J. Ethnopharmacol. **16**: 275-287.
- Getu, A., Asfaw, Z., and Kelbessa, E. 2015. Ethnobotanical study of medicinal plants used by local communities of Minjar-Shenkora district, North Shewa Zone of Amhara Region, Ethiopia J. Med. Plant Studies **3**(6): 01-11.
- Ghani, A. 2003. Medicinal Plants of Bangladesh with Chemical Constituents and Uses (Second Edition). Asiatic Society of Bangladesh, Dhaka, 603 pp.
- Hanako, J.K. and Tsurho, K. 2016. Documentation of medicinal plants and its uses by Phom tribe of Longleng district, Nagaland, India. J. Med. Plant Studies **4**(6): 167-172.
- Hassan, M.A. and Khan, M.S. 1986. Ethnobotanical record of Bangladesh-1: Plants used for healing fractured bones. J. Asiat. Soc. Bangladesh Sci. **12**(1&2): 33-39.
- Hassan, M.A. and Khan, M.S. 1996. Ethnobotanical record of Bangladesh-2. Plants used for healing cuts and wounds. Bangladesh J. Plant Taxon. **3**(2): 49-52.
- Heinrich, M., Ankli, A., Frei, B. and Weimann, C. 1998. Medicinal plants in Mexico: healers consensus and cultural importance. Social Sci. Med. **47**: 1859-1871.
- Hossain, U. and Rahman, M.O. 2018. Ethnobotanical uses and informant consensus factor of medicinal plants in Barisal district, Bangladesh. Bangladesh J. Plant Taxon. **25**(2): 241-55.
- Islam, S. and Uddin, M.Z. 2022. Study of ethnomedicinal plants used by the local people of Raipura upazila of Narshingdi district. Bangladesh J. Plant Taxon. **29**(1): 137-156.

- Kadir, M.F., Sayeed, S.B. and Mia, M.M.K. 2012. Ethnopharmacological survey of medicinal plants used by indigenous and tribal people in Rangamati, Bangladesh. *J. Ethnopharm.* **144**(3): 627-637.
- Khatun, M.M. and Rahman, A.H.M.M. 2018. Medicinal plants used by the local people at the village Pania under Baghmara upazila of Rajshahi District, Bangladesh. *Discovery* **54** (266): 60-71.
- Kona, S. and Rahman A.H.M.M. 2016. Inventory of medicinal plants at Mahadebpur upazila of Naogaon district, Bangladesh. *Appl. Ecol. Environ. Sci.* **4**(3): 75-83.
- Mia, M.M.K. and Huq, A.M. 1988. A preliminary ethno-botanical survey in the Jointiapur, Tamabil and Jafflong area, Sylhet, Bangladesh. *Nat. Herba. Bull.* **3**: 1-10.
- Nahar, J., Kona, S., Rani, R., Rahman, A.H.M.M. and Islam, A.K.M.R. 2016. Indigenous medicinal plants used by the local people at Sadar upazila of Naogaon district, Bangladesh. *Inter. J. Adv. Res.* **4**(6): 1100-1113.
- Rahim, Z.B., Rahman M.M., Saha, D., Hosen, S.M.Z., Paul, S. and Kader, S. 2012. Ethnomedicinal plants used against jaundice in Bangladesh and its economic prospects. *Bull. Pharma. Research.* **2**(2): 91-105.
- Rahman, A.H.M.M. 2013. Traditional medicinal plants used in the treatment of different skin diseases of *Santals* at Abdullapur village under Akkelpur upazilla of Joypurhat district, Bangladesh, *Biomed. and Biotech.* **1**(2): 17-20.
- Rahman, M.A. 2020 Towards inventory and assessment of plant resources of Bangladesh: Challenges and Prospects. *J. Biodivers. Conserv. Bioresour. Manag.* **6**(1): 47-58.
- Rajmurgan, J., Srineevasan, L., Govindasamy, I., Sathiskumar, S., Priyanka, P. and Mohandass, D. 2016. Documentation of traditional knowledge on medicinal plants of Thirukkanur village, Puducherry region, India. *J. Med. Plant Studies* **4**(5): 44-49.
- Ramachandrani, S., Fadil, L., Gopi, C., Amala, M. and Dhanaraju, M.D. 2021. Evaluation of bone healing activity of *Cissus quadrangularis* (Linn), *Cryptolepis buchanani* and *Sardinella longiceps* in Wistar rats. *Beni-Suef Univer. J. Basic & Appl. Sci.* **10**(30): 1-9.
- Sajib, N.H. and Uddin, S.B. 2015. Ethnomedicinal study of plants in Hathazari, Chittagong, Bangladesh. *Pertanika J. Trop. Agric. Sci.* **38**(2): 197-210.
- Sohel, M.D.D., Kawsar, M.D.H., Sumon, M.D.H.U. and Sultana, T. 2016. Ethnomedicinal studies of Lalmohan gthana in Bhola district, Bangladesh. *Altern Integr. Med.* **5**: 1.
- Srithi, K., Balslev, H., Wangpakapattanawong, P., Srisanga, P. and Trisonthi, C. 2009. Medicinal plant knowledge and its erosion among the Mien (Yao) in northern Thailand. *J. Ethnopharmacol.* **123**(2): 335-342.
- The Plant List, 2013. The Plant List, a working list of all plant species. Version 1.1 <<http://www.theplantlist.org/>>.
- TROPICOS, 2018. Tropicos.org. <www.tropicos.org>. Missouri Botanical Garden, Saint Louis, Missouri, USA.
- Uddin, M.Z. and Roy, S., Hassan, M.A. and Rahman, M.M. 2008. Medicobotanical report on the *Chakma* people of Bangladesh. *Bangladesh J. Plant Taxon.* **15**(1): 67-72.
- Uddin, M.Z., Arefin, M.K., Alam, M.F., Kibria, M.G., Podder, S.L. and Hassan, M.A. 2017. Knowledge of ethnomedicinal plants and informant consensus in and around Lawachara National Park, J. *Asiat. Soc. Bangladesh Sci.* **43**(1): 101-123.
- Uddin, M.Z., Hassam, M.A. and Sultana, M. 2006. Ethnobotanical survey of medicinal plants in Phulbari upazila of Dinajpur district, Bangladesh. *Bangladesh J. Plant Taxon.* **12**(1): 63-68.
- Uddin, M.Z., Hassan, M.A., Rahman, M.M. and Arefin, M.K. 2012. Ethno-medico-botanical study in Lawachara National Park, Bangladesh. *Bangladesh J. Bot.* **41**(1): 97-104.
- Uddin, M.Z., Kibria, M.G. and Hassan, M.A. 2015. Study of ethnomedicinal plants used by the local people of Feni district, Bangladesh. *J. Asiat. Soc. Bangladesh, Sci.* **41**(2): 203-223.
- Uddin, S.B., Sajib, N.H. and Islam, M.M. 2011. Investigation of ethnomedicinal plants of Subarnachar in Noakhali, Bangladesh. *The Chittagong Univ. J. Biol Sci.* **6**(1&2): 77-86.
- Uddin, S.N., Uddin, M.Z., Hassan, M.A. and Rahman, M.M. 2004. Preliminary ethnomedicinal plant survey in Khagrachari district, Bangladesh. *Bangladesh J. Plant Taxon.* **12**(1): 63-68.

- Van Wyk, B.E., Oudtshoorn, B.V. and Gericke, N. 1997. Medicinal Plants of South Africa. Johannesburg: Briza.
- WHO 2001. World Health Organization traditional medicine strategy, 2002-2005. Geneva, pp. 1-52.
- Yasmin, F. and Rahman, A.H.M.M. 2017. Ethnomedicinal plants used by the Santal tribal practitioners at Sadar upazila of Joypurhat district, Bangladesh. *Indian J. Sci.* **24**(93): 435-453.
- Yusuf, M., Rahman, M.A., Choudhury, J.U. and Begum, J. 2002. Indigenous knowledge about the use of Zingibers in Bangladesh. *J. Econ. Taxon. Bot.* **26**(3): 566-570.
- Yusuf, M., Wahab, M.A., Choudhury, J.U. and Begum, J. 2006. Ethno-medico-botanical knowledge from Kaulkhali proper and Betunia of Rangamati district. *Bangladesh J. Plant Taxon.* **13**(1): 55-61.

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