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RESEARCH ARTICLE

Ethno-medicinal Survey of Angiosperm Plants Used by Santal Tribe of Joypurhat District, Bangladesh

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Abstract

Ethno-medicinal knowledge of Santal Tribe of Joypurhat district, Bangladesh was documented during the field investigation from July 2013 to June 2014. A total of 95 angiosperm plant species belonged to 47 families and 86 genera has been recorded, with their correct botanical identification, local name, family, habit, part used, indications of disease and mode of application for each plant.

INTRODUCTION

Plants have provided man with all his needs in terms of shelter, clothing, food, flavors and fragrances. Plants have formed the basis of system among traditional medicine which has given rise to some important drugs still in use today. Many ancient nations have awakened to the importance of herbal medicine which brings more cures (Ashur, 1986). The existence and use of plants to treat diseases are as old as man. Man's dependence on plant has in no way decreased, yet there are comprehensive documentations of the plants, exploited for their medicinal uses in some parts of the plants such as leaves, stem and root. The decoctions of these plants are used in the treatment of some diseases such as urinary problems, diabetes, asthma, stroke, stomachache, hypertension, diarrhea and wounds (Anely et al., 2007).

Even today, traditional medicine is still the predominant means of health care in developing countries where about 80% of their total population depends on it for their well being (Busmann et al., 2006). Plants are the basis for the development of modern drugs and medicinal plants have been used for many years in daily life to treat disease all over the world (WHO, 1991; Patil and Magdum, 2011). However, the knowledge of medicinal plant is rapidly dwindling due to the influence of Western lifestyle, reducing in number of generations to carry on the use of plant species in traditional medicine which has increased the interest throughout the world (Oliver, 2005). World Health Organization estimates that 70% of populations from many countries are using traditional of folk medicine to cure various ailments (WHO, 1991).

In Bangladesh so far a number of ethno-botanical researches have been carried out Alam (1992, 1996), Chakma (2003), Khan (1998), Khan and Huq (1975), Hasan and Huq (1993), Tripura (1994), Yusuf et. al. (1994, 2006), Hassan (1988), Choudhury and Rahmatullah (2012), Faruque and Uddin (2014), Uddin et al. (2001, 2004, 2006, 2008, 2012, 2014), Khisha (1996), Rahman et. al. (2008a, 2008b), Rahman et al. (2010), Rahman et. al. (2012), Rahman (2013a, 2013b, 2013c, 2013d, 2013e, 2013f, 2013g, 2013h, 2013i, 2013j), Rahman et. al. (2013a, 2013b, 2013c, 2013d), Rahman and Khanom (2013), Rahman and Akter (2013), Rahman et al. (2014a, 2014b, 2014c), Rahman and Parvin (2014), Rahman and Gulshana (2014), Rahman and Rahman (2014), Rahman and Rojonigondha

(2014), Rahman and Debnath (2014), Rahman (2014a, 2014b), Rahman (2015) and Anisuzzaman et al. (2007). The aim of the present study was to first record medicinal knowledge of plants used by the Santal Tribe living of Joypurhat, Bangladesh.

Materials and Methods

The present study in based on the intensive field of the area during the period of July 2013 to June 2014. A total of 75 people having an age rage 15-55 years were interviewed using semi-structured interviewed method (Alexiades, 1996). Professionally they were peasant, day labor, farmer, betel leaf cultivators, house wives, medicine men, small shop keepers etc. Among them 30 were female and rest 45 were male. Regular field studies were made in the study area during the period. The information about the plants used for various diseases was gathered through interviews and discussion with the elderly people, medicine men and traditional medical practitioners were also consulted. Triangulation methods have been followed for data validation in the field (Dean and Whyte, 1959). Plant specimens with flowers and fruits were collected and processed using standard herbarium techniques (Hyland, 1972; Alexiades, 1996). Herbal plants referred by these people were authentically identified with the help of Khan and Huq (1975), and Ahmed et al. (2009). The voucher specimens are stored at Rajshahi University Herbarium (RUH) for future reference.

Results and Discussion

In the present ethno-botanical survey, a total of 95 species belonging to 86 genera and 47 families were recorded. For each species local name, scientific name, habit, family, ailments to be treated, mode of treatment and part(s) used are provided (Table 1).

Analysis of the data based on habits showed that leading medicinal plant species 45.26% belonged to herbs, 13.68% shrubs, 29.47% trees and 12.63% climbers (Table 2). Giday (2001) reported that herb is the leading to medicinal species in his article on Zay people of Ethiopia whereas Teklehamymanot and Giday (2007) reported same result among the people of Zegie Peninsula, Northwestern Ethiopia. The present report on leading medicinal species as herb, is similar to the above findings.

Use of plant parts as medicine shows variation. Leaves (57.89%) are the leading part used in a majority of medicinal plants followed by 22.10% fruits, 21.05% roots, 9.47% whole plant, 8.42% bark, 8.42% stem, 3.15% latex, 3.15% rhizomes, 3.15% tuber, 2.10% bulb, 2.10% seed, 1.05% wood, 1.05% flower and 1.23% inflorescence (Table 3). Distribution of medicinal plant species in the families shows variation (Table 1). Asteraceae is represented by 10 species, Fabaceae is represented by nine species and each Euphorbiaceae, Solanaceae and Rutaceae is represented by four species. Three species in each was recorded by eight families. A single species in each was recorded by 29 families while two species in each was recorded by five species. The survey indicated that the common medicinal plant families in the study area are Acanthaceae, Amaranthaceae, Apiaceae, Apocynaceae, Araceae, Asclepiadaceae, Caricaceae, Combritaceae, Cucurbitaceae, Fabaceae, Dilleniaceae, Liliaceae, Meliaceae, Moringaceae, Moraceae, Rutaceae and Solanaceae. These findings of common medicinal plant families in the study are in agreement with Yusuf *et al.* (2009), Alam (2007), Ghani (1998) and Ahmad (2012).

The survey has also recorded 61 categories of uses of 95 medicinal plants (Table 1). This is the indication of rich knowledge of medicinal uses of plants by the local people in the study area. Among them, 16 species were used to cure fever, 11 species for dysentery, 10 species for each of diabetes and cough, 9 species for diuretic, 8 species for each of diarrhea and abscess, 7 species for jaundice. Thirty four categories of ailments were treated by two to six species and other seventeen categories of ailments were treated by only one species.

Use of species in different ailments showed also variations. *Xanthium indicum* Koen ex Roxb. has been used for treatment of 9 ailments, *Enhydra fluctuans* Lour. and *Stephania japonica* (Thunb.) Miers. has been used for treatment of 7 ailment in each and *Andrographis paniculata* (Burm.f.) Wall. ex Nees., *Alocasia indica* (Roxb.) Schott., *Wedelia chinensis* (Osbeck) Merr., *Ananas comosus* (L.) Merr. has been used for treatment of 6 ailments in each and each of *Aristolachia indica* L., *Carica papaya* L., *Phyllanthus emblica* L., *Azadirachta indica* A. Juss., *Kalanchoe pinnata* (Lamk.) Pers. for 5 ailments. For treating two to four ailments 56 species were used. The remaining 27 species of the total were used for the treatment of a single ailment (Table 1). Among the medicinal use of plants, the survey reported a good number of new uses those were not mentioned in the previous literatures (Yusuf *et al.*, 2009; Ghani, 1998; Alam, 2007; Ahmad, 2012).

Table 1. List of plants and their diversity in use of medicinal purposes by the Santal Tribe living of Joypurhat District, Bangladesh.

S/N	Name of family	Name of species/plants	Local name	Habit	Part(s) used	Ailments	Treatment process
1	Acanthaceae	*Adhatoda* zeylanica Medic.	Bassak	Shrub	L	Cough, fever	Taken leaves juice
2	Acanthaceae	*Justicia gendarussa* Burm. f.	Jagathmadan	Herb	L	Asthma, fracture, itches, wound	Taken leaves juice, also applied leaves paste
3	Acanthaceae	*Andrographis paniculata* (Burm. f.) Wall ex Nees.	Kalomegh	Herb	L, WP	Wound, itches, dysentery, diarrhea, fever, helminthiasis	Taken leaves paste, also applied whole plants juice and leaves juice mixed with salt and water
4	Asclepiadaceae	*Calotropis procera* (Aiton) W.T. Aiton	Akanda	Shrub	L	Piles	Taken leaves extract
5	Amaranthaceae	*Achyranthes aspera* L.	Apang	Herb	L, R	Abortion, diuretic, eczema	Taken roots juice, also taken leaves paste
6	Amaranthaceae	*Amaranthus spinosus* L.	Kantanotey	Herb	WP	Asthma	Applied whole plants juice
7	Amaranthaceae	*Amaranthus lividus* L.	Noteysak	Herb	R	Menstrual flow	Roots act as reduce menstrual flow.
8	Anacardiaceae	*Mangifera indica* L.	Am	Tree	L	Toothache	Taken young leaves decoction
9	Annonaceae	*Annona squamosa* L.	Ata	Tree	L, R	Abscess, dysentery	Taken leaves paste, also applied roots Juice
10	Apiaceae	*Centella asiatica* (L.) Urban	Thankuni	Herb	WP, L	Dysentery, eczema, headache	Taken whole plant vegetable, also taken young leaves paste
11	Apocynaceae	*Alstonia scholaris* (L.) R. Br.	Chatim	Tree	B	Dysentery, fever	Applied bark Juice
12	Apocynaceae	*Rauvolfia serpentina* (L.) Benth. Ex Kurz.	Sarpagandha	Herb	R	Blood pressure, heart disease, dysentery, diarrhea	Applied roots juice, also taken roots decoction
13	Aloeaceae	*Aloe vera* Burm. f.	Ghritakumari	Herb	L	Piles, menstrual disease, sex problems	Applied leaves mucilage, also taken leaves juice
14	Averrhoaceae	*Averrhoa carambola* L.	Kamranga	Tree	F	Fever, jaundice, bleeding piles	Taken fruits
15	Araceae	*Typhonium trilobatum* (L.) Schott.	Ghetkachu	Herb	L, T	Constipation, colic, digestive,	Taken leaves curry, also taken tuber curry and paste
16	Araceae	*Colocasia esculenta* (L.)	Kachu	Herb	L, T	Constipation, colic, digestive	Taken leaves curry, also taken tuber

		Schott.					curry and paste
17	Araceae	*Alocasia indica* (Roxb.) Schott.	Mankachu	Herb	L, T	Cough, constipation, kidney disease, stomachic, colic, Piles	Taken leaves curry, also taken tuber curry and paste
18	Arecaceae	*Cocos nucifera* L.	Narikel	Tree	R, F	Diuretic, menstrual disease, diarrhea	Taken roots juice, also taken green coconut water
19	Arecaceae	*Borassus flabellifer* L.	Tal	Tree	F	Diuretic	Taken unripe fruit pulp
20	Aristolachiaceae	*Aristolachia indica* L.	Isharmul	Climber	L, SD	Cough, inflammations, biliousness, ulcers, eczema	Taken leaves juice, also taken seeds paste and leaves juice mixed with castor oil
21	Asteraceae	*Eclipta alba* (L.) Hassk.	Kalokeshi	Herb	L	Wound, skin disease	Taken young leaves paste
22	Asteraceae	*Mikania cordata* (Burm.f.) B. L. Rob.	Assamlata	Climber	L	Cut injury	Applied leaves juice
23	Asteraceae	*Spilanthes calva* DC.	Nakphul	Herb	I	Toothache	Chewing inflorescence
24	Asteraceae	*Cirsium arvense* (L.) Scop.	Circium	Herb	L, S	Antiscorbutic	Both leaves and stem paste taken
25	Asteraceae	*Xanthium indicum* Koen ex Roxb.	Ghagra	Herb	WP, S, F, R, L	Diabetes, cancer, small-pox, snake-bite, insect-bite, ulcers, boils, abscess, herpes	Taken young stems, also taken roots juice, taken fruits, applied whole plants paste, leaves paste
26	Asteraceae	*Parthenium histerophorus* L.	Gandiboti	Herb	WP, R	dysentery	Applied whole plants juice, also taken roots juice
27	Asteraceae	*Enhydra fluctuans* Lour.	Helencha	Herb	L	Inflammation, leucoderma, bronchitis, biliousness, small pox, gonorrhea, headache	Taken leaves juice, also applied leaves juice mixed with milk and taken leaves paste
28	Asteraceae	*Vernonia patula* (Dryand) Merril	Kuksim	Herb	FL	Ulcers, wounds, dropsy	Taken flower heads paste
29	Asteraceae	*Wedelia chinensis* (Osbeck) Merr.	Mohabringaraj	Herb	WP, L	Hair disease, jaundice, fevers, toothache, asthma, bronchitis	Taken leaves juice, also applied whole plants juice and paste
30	Asteraceae	*Wedelia trilobata* (L.) A.S. Hitchc.	Mohabringaraj	Herb	L	Cough, skin diseases, alopecia, abdominal pain	Taken leaves juice and paste
31	Bombacaceae	*Bombax ceiba* L.	Shimul	Tree	B, R	Dysentery, excessive menstrual discharge,	Taken barks juice, also taken immature roots juice

						diabetes, sex problems	
32	Boraginaceae	*Heliotropium indicum* L.	Hatisur	Herb	L	Fever, skin disease	Taken leaves decoction, also applied leaves paste
33	Bromeliaceae	*Ananas comosus* (L.) Merr.	Anaros	Herb	F	Abortion, cough, diuretic, fever, helminthiasis, worm	Taken unripe fruits juice, also taken ripe fruits
34	Caricaceae	*Carica papaya* L.	Papaya	Shrub	LA, F	Itches, constipation, indigestion, liver disease, diarrhea	Taken latex, also taken, also applied ripe and unripe fruits
35	Chenopodiaceae	*Chenopodium album* L.	Batuashak	Herb	L	Digestive, stomachic, constipation	Taken young leaves curry
36	Combretaceae	*Terminalia arjuna* (Roxb.) Wight & Arn.	Arjun	Tree	L, B, F	Burning sensation, blood pressure, heart disease, worm	Applied leaf soaked, also taken bark juice, dust made from dry shoot bark and, unripe fruits
37	Combretaceae	*Terminalia bellirica* (Gaertn.) Roxb.	Bohera	Tree	F, S	Burning sensation, rheumatism	Taken fruits, also applied oil extracted from seeds
38	Combretaceae	*Terminalia chebula* Retz.	Haritaki	Tree	F	Constipation, indigestion, rheumatism, urinary disease	Taken ripe fruits, also applied unripe fruits
39	Costaceae	*Costus speciosus* Sm.	Costus	Herb	Rh	Diabetes, high fever	Taken rhizome juice
40	Crassulaceae	*Kalanchoe pinnata* (Lamk.) Pers.	Patharkuchi	Herb	L	Cough, dysentery, diuretic, diabetes, fracture	Applied young leaves juice, also taken leaves paste
41	Cucurbitaceae	*Momordica charantia* Descourt.	Korola	Climber	L, F	Chickenpox, rheumatism, diabetes	Applied leaves Juice, also taken curry made from unripe fruits
42	Cucurbitaceae	*Coccinia grandis* (L.) J. Voigt.	Telakucha	Climber	L	Diabetes, fever	Taken young leaves vegetable
43	Cucurbitaceae	*Cucurbita pepo* L.	Lau	Climber	S	Tooth infection	Stem decoction gargling
44	Convolvulaceae	*Cuscuta reflexa* Roxb.	Sarnalata	Climber	WP	Liver disease	Taken whole plant decoction
45	Dilleniaceae	*Dillenia indica* L.	Chalta	Tree	F	Hair tonic	Taken fruits juice
46	Euphorbiaceae	*Phyllanthus emblica* L.	Amloki	Tree	F	Burning sensation, vomiting, cough, indigestion, jaundice	Taken ripe and dried fruits
47	Euphorbiaceae	*Euphorbia hirta* L.	Dudhia	Herb	L	Bronchitis, cough	Taken leaves juice
48	Euphorbiaceae	*Acalypha indica*	Muktajhuri	Herb	L	Skin disease	Taken leaves juice

		L.					
49	Euphorbiaceae	*Ricinus communis* L.	Rendri	Tree	L, SD	Headache, rheumatism	Taken leaves paste, also applied seeds oil
50	Fabaceae	*Mimosa diplotricha* C. Wright ex Sauv.	Sadalajjabati	Herb	L	Skin diseases	Leaves decoction applied physically
51	Fabaceae	*Cajanus cajan* (L.) Millsp.	Arhar	Shrub	L, R	Diabetes, jaundice	Applied roots Juice, also taken young leaves juice
52	Fabaceae	*Senna alata* (L.) Roxb.	Dadmardan	Shrub	L	Eczema, dad	Taken leaves decoction, also taken paste
53	Fabaceae	*Senna sophera* (Linn) Roxb.	Kalkasunda	Herb	L	Dyspepsia	Taken leaves and roots decoction
54	Fabaceae	*Abrus precatorius* L.	Kuch	Climber	S	Paralysis	Taken seeds paste
55	Fabaceae	*Erythrina variegata* L.	Madar	Tree	L, B, R	Toothache, fever, menstrual disease	Applied leaves juice, also taken bark juice and roots juice
56	Fabaceae	*Mimosa pudica* L.	Lajjabati	Climber	R	Fever, snake-bite	Taken roots decoction, also taken roots juice
57	Fabaceae	*Dalbergia sissoo* Roxb.	Sissoo	Tree	W	Abscess	Taken wood paste
58	Fabaceae	*Tamarindus indica* L.	Tentul	Tree	F, L	Burning sensation, heart disease	Taken ripe fruit pulps, also taken leaves juice
59	Lamiaceae	*Ocimum americanum* L.	Babuitulshi	Herb	L	Bronchitis	Leaves juice taken
60	Lamiaceae	*Leucas lavendulifolia* Sm.	Setadron	Herb	L	Fever, worm	Taken young leaves juice
61	Lamiaceae	*Ocimum sanctum* L.	Tulsi	Shrub	L, R	Cough, fever	Taken young leaves juice, also applied roots juice
62	Liliaceae	*Allium cepa* L.	Piaj	Herb	BL	Cough, headache	Taken bulb/scales juice
63	Liliaceae	*Allium sativum* L.	Rashun	Herb	BL	Piles, rheumatism	Taken fresh bulb, also applied bulb juice
64	Liliaceae	*Asparagus racemosus* L.	Satamuli	Climber	R, WP	Diarrhea, diabetes, jaundice, urinary disease	Taken tuberous roots juice, also taken whole plant juice
65	Lythraceae	*Lawsonia inermis* L.	Mehendi	Shrub	L	Wound, burning sensation	Taken leaves paste
66	Meliaceae	*Azadirachta*	Neem	Tree	L	Worm, chicken	Taken young leaves

		indica A. Juss.				pox, eczema, itches, helminthiasis	juice mixed with water of boil rice, Leaves boiled with water and apply physically, also taken leaves paste, taken young leaves juice mixed with salt and water
67	Moraceae	*Ficus benghalensis* L.	Bot	Tree	L	Abscess	Applied leaves paste
68	Menispermaceae	*Stephania japonica* (Thunb.) Miers.	Akarnandi	Climber	R, L	Astringent, fever, diarrhea, dyspepsia, abscess, vertigo, dysentery	Taken both of root and leaves juice, applied leaves paste, also taken root paste
69	Moraceae	*Ficus recemosa* L.	Jogdumur	Tree	LA	Piles, diabetes	Taken latex, also taken curry made from unripe fruit
70	Moraceae	*Artocarpus heterophyllus* Lamk.	Kathal	Tree	L, R, B	Asthma, itches, diarrhea, excessive menstrual discharge	Taken young leaves Juice, also taken young roots Juice and bark Juice
71	Moringaceae	*Moringa oleifera* Lamk.	Sogina	Tree	F, R	Chicken pox, diabetes, paralysis, fever	Taken fruits, also taken roots decoction
72	Musaceae	*Musa paradisiaca* L.	Kala	Herb	S	Blood pressure	Sap of the central cylindrical stem of the fruited plants is used
73	Myrtaceae	*Syzygium cumini* (L.) Skeels.	Jam	Tree	B, S	Dysentery, wound, diabetes	Applied bark paste, also taken dry seed dust mixed with normal water
74	Myrtaceae	*Psidium guajava* L.	Piyara	Tree	L, B, F	Toothache, dysentery, diarrhea, worm	Taken leaves decoction, also applied bark juice and fruits
75	Oxalidaceae	*Oxalis corniculata* L.	Amrul	Herb	L	Anemia, cough	Taken leaves Juice, also taken young leaves vegetable
76	Papaveraceae	*Argemone mexicana* L.	Sialkanta	Herb	R, S, LA	Diuretic, diabetes, jaundice, itches, skin disease	Taken roots juice, also taken stems curry and latex
77	Piperaceae	*Piper betel* L.	Pan	Climber	L	Cut injury, stomachache	Leaves juice taken, also applied leaves with catechu
78	Poaceae	*Cynodon dactylon* (L.) Pers.	Durba	Herb	L, WP	Skin disease, stop bleeding, wound	Taken young leaves paste, also applied whole plant Paste
79	Polygonaceae	*Persicaria hydropiper* (L.) Delabre	Panimarich	Herb	L	Insects-bite	Applied leaves juice
80	Punicaceae	*Punica granatum*	Dalim	Tree	F	Anemia, diarrhea,	Taken ripe fruits

		L.				dysentery	Juice, also taken Immature fruit juice
81	Rhamnaceae	*Zizyphus mauritiana* Lamk.	Boroi	Tree	L	Headache	Taken young leaves paste
82	Rutaceae	*Aegle marmelos* (L.) Corr. Serr.	Bel	Tree	L, F	Abscess, fever, dysentery, indigestion	Applied young leaves juice, also taken immature fruits decoction and ripe fruits
83	Rutaceae	*Glycosmis pentaphylla* (Retz.) DC	Datmajan	Shrub	L, F	Jaundice, dysentery	Applied leaves juice, also taken ripe fruits juice
84	Rutaceae	*Citrus grandis* (L.) Osb.	Jambura	Tree	F	Anemia	Taken ripe fruits Juice
85	Rutaceae	*Feronia limonia* (L.) Swingle	Kathbel	Tree	L, F	Vomiting, diuretic	Taken leaves Juice, also applied fruit pulp
86	Scrophulariaceae	*Scoparia dulcis* L.	Talmisri	Herb	R	Snake-bite	Taken roots Juice
87	Solanaceae	Solanum melongena L.	Begun	Shrub	F	Pain waiver	Taken fruits paste
88	Solanaceae	*Datura metel* L.	Dhutra	Shrub	L	Asthma, rheumatism	Taken leaves cigarette, also applied leaves paste
89	Solanaceae	*Physalis minima* L.	Kapalphutki	Herb	R	Diuretic	Taken roots Juice
90	Solanaceae	*Solanum nigrum* L.	Kakmachi	Herb	F	Diuretic, heart disease	Applied green fruits Juice
91	Verbenaceae	*Clerodendrum viscosum* Vent.	Bhant	Shrub	L	Vomiting, worm, dyspepsia	Applied leaves juice
92	Verbenaceae	*Vitex negundo* L.	Nishinda	Shrub	L, R	Fever, rheumatism	Taken roots juice, also applied leaves paste
93	Vitaceae	*Cissus quadrangularis* L.	Harzora	Climber	B	Bone fracture	Taken bark Paste
94	Zingiberaceae	Zingiber officinale Roscoe	Ada	Herb	Rh	Fever, bronchitis	Applied zinger with betel and also taken juice
95	Zingiberaceae	*Curcuma longa* L.	Holdi	Herb	Rh	Abscess, eczema	Taken rhizome paste

L=Leaf, LA=Latex, S=Stem, SD=Seed, F=Fruit, WP=Whole plant, B=Bark, R=Root, FL= Flower, BL=Blub, Rh=Rhizome, W=Wood, I=Inflorescence

Table 2. Analysis of the data based on habit showed that leading medicinal plants species.

Habit	No. of species	Percentage	Total number of species
Herbs	43	45.26%	95
Shrubs	13	13.68%	95
Climbers	12	12.63%	95
Trees	28	29.47%	95

Table 3. Number of plant parts used for medicinal purpose.

Name of plant parts	Use of plant parts	Percentage	Total number of species
Leaf	55	57.89%	95
Fruit	21	22.10%	95
Root	20	21.05%	95
Whole plant	9	9.47%	95
Bark	8	8.42%	95
Stem	8	8.42%	95
Tuber	3	3.15%	95
Latex	3	3.15%	95
Rhizome	3	3.15%	95
Bulb	2	2.10%	95
Seed	2	2.10%	95
Flower	1	1.05%	95
Wood	1	1.05%	95
Inflorescence	1	1.05%	95

Conclusion

The present findings are probably the first record of ethno-medicinal knowledge for Joyurhat district, Bangladesh using standard research protocols. Documentation of this unexplored ethno-medicinal information will not only support to preserve the aged-old herbal knowledge but also will promote the scope of drug development by pharmaceutical industry based on traditional knowledge.

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