

Ethno Medicinal and Phytochemical Screening of Some Hydrophytes and Marsh Plants of Tripura, India

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Abstract: A total 20 species belonging to 14 families and 18 genus were reported for their ethnomedicinally uses. Alkaloids, Glycoside, terpenoid, steroid, flavonoids, tannins, saponins and phytobumins distribution in twenty ethnomedicinally important hydrophytes and marsh plants belonging to 14 different families were assessed and compared. Most of the plant found to contains alkaloid, glycoside, steroid and flavonoids. The significance of the plants in traditional medicine and the importance of the distribution of these chemical constituents were discussed with respect to the role of these plants in ethno medicine in India. The result of the phytochemical screening could of immense importance in formulating new drugs from those unexploited hydrophytes.

Key words: Ethomedicine • Phytochemical Screening • Hydrophytes • India

INTRODUCTION

Plant-derived substances have recently become of great interest owing to their versatile applications. Medicinal plants are the richest bio-resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs [1]. It is now clear that, the medicinal value of these plants lies in the bioactive phytochemical constituents that produce definite physiological effects on human body. These natural compounds formed the base of modern drugs as we use today [2]. Plant products have been part of phytomedicines since time immemorial. These can be derived from any part of the plant like bark, leaves, flowers, seeds, etc [3] i.e., any part of the plant may contain active components. Knowledge of the chemical constituents of plants is desirable because such information will be of value for the synthesis of complex chemical substances. Such phytochemical screening of various plants is reported by many workers [4]. Several phytochemical surveys have been published, including the random sampling approach which involved some plant

accessions collected from all parts of the world. The major chemical substances of interest in these surveys have been the alkaloids and steroidal sapogenins (saponins), however, other diverse groups of naturally occurring phytochemicals such as flavonoids, tannins, unsaturated sterols, triterpenoids, essential oils, etc. have also been reported [5-8].

Hydrophytes grow profusely in lakes and waterways all over the world and have in recent decades their negative effects magnified by man's intensive use of natural water bodies. Eradication of this water plants are has proved almost impossible and even reasonable control is difficult. The potential of aquatic plants as food and feed has been emphasized by several authors [9, 10]. Large growths of hydrophytes in lakes and waterways of tropical countries, although a menace, represent a natural resource of green leaves [11]. With increasing interest in finding new drugs, the wild or unutilized plants receive more attention which offers a good scope to meet the increasing demand for novel drug discovery. The present study was carried out in Tripura, India. Several ethno-botanical studies [12-17] in the state have documented various healing plants with folk recipes.

However literature related to the ethno-medicinal importance of hydrophytes and marsh plants are scarce. knowledge of the chemical constituents of plants is desirable, not only for the discovery of therapeutic agents, but also because such information may be of value in disclosing new sources of such economic materials as tannins, oils, gums, precursors for the synthesis of complex chemical substances, etc. In addition, the knowledge of the chemical constituents of plants would further be valuable in discovering the actual value of folkloric remedies [18]. In the present work, qualitative phytochemical analysis was carried out in 20 plants.

MATERIALS AND METHODS

Study Area: Tripura is India's third smallest hilly state in the North-eastern part of the country (Figure 1). Tripura state lies between 22°56' to 24°32'N latitude and between 90°09' to 92°20'E longitudes covering an area of 10,491 sq.km. In Tripura, 19 different tribal communities are found to dwell, viz. *Tripura, Mog, Riang, Shantal, koki, Noatia, Lusai, Halam, Jamatia, Chakma* and others. The climate of Tripura is characterized by intermediate temperature and highly humid atmosphere. During summer (April-May), maximum temperature reaches 38°C. Humidity remains high throughout the year. In summer relative humidity ranges 50-75% while during monsoon it remains over 85%. There are many lakes and ponds in the state, which favours the occurrence of a rich hydrophytic flora in this state (Fig. 1).

Sample Preparation: The plant materials were air-dried at room temperature (26°C) for 2 weeks, after which it was grinded to a uniform powder. The ethanol which it was grinded to a uniform powder. The ethanol powdered plant materials in 1 L of ethanol at room temperature for 48 h. The extracts were filtered separately after 48 h, first through a Whatmann filter paper No. 42 (125mm) and then through cotton wool. The extracts were concentrated using a rotary evaporator with the water bath set at 40°C. The percentage yield of extracts ranged from 7–19%w/w.

Alkaloids: Alkaloids are basic nitrogenous compounds with definite physiological and pharmacological activity. Alkaloid solution produces white yellowish precipitate when a few drops of Mayer's reagents are added [19]. Most alkaloids will precipitate from neutral or slightly acidic solution by Mayer's reagent [20]. The alcoholic extract was evaporated to dryness and the residue was heated on a boiling water bath with 2 % hydrochloric acid.

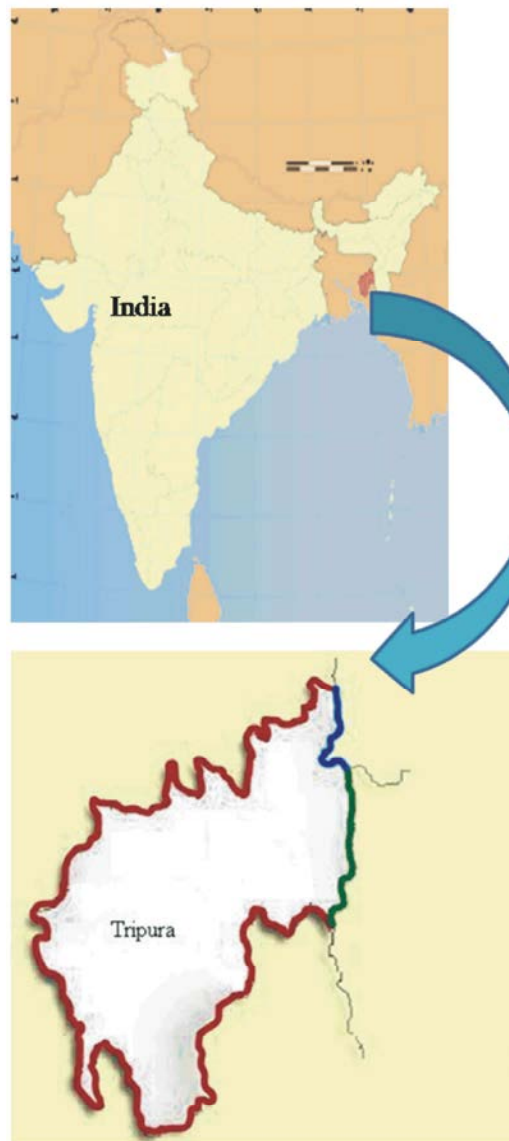


Fig. 1:

After cooling, the mixture was filtered and treated with a few drops of Mayer's reagent. The samples were then observed for the presence of turbidity or yellow precipitation.

Glycosides: Glycosides are compounds which upon hydrolysis give rise to one or more sugars (glycones) and a compound which is not a sugar (aglycone or genine). To the extract solution in glacial acetic acid, few drops of ferric chloride and concentrated sulphuric acid are added and to be observed for reddish-brown coloration at the junction of two layers and the bluish-green in the upper layer [21].

Terpenoids and Steroids: Four milligrams of extract was treated with 0.5 ml of acetic anhydride and 0.5 ml of chloroform. Then concentrated solution of sulphuric acid was added slowly and it will turn red violet for terpenoids and bluish-green for steroids [19].

Flavonoids: Four milliliters of extract solution was treated with 1.5 ml of 50 % methanol solution. The solution was warmed and metal magnesium was added. Then, 5 – 6 drops of concentrated hydrochloric acid was added and red color will develop for flavonoids and orange for flavones [19].

Tannins: To 0.5 ml of extract solution 1 ml of water and 1–2 drops of ferric chloride solution was added. Blue color will develop for gallic tannins and green black for catecholic tannins [22]

RESULTS AND DISCUSSION

Enumeration of Ethnomedicinally Important Hydrophytes and Marsh Plants: The present study focused mainly on the plant species used by different tribal and non-tribal's community of Tripura for primary healthcare needs as reported by the informants/traditional healers. The reported plants were arranged according to their scientific name, voucher specimen number, plant name code, family, vernacular names (as recorded during the field work), parts used, therapeutic uses and method of usage of herbal preparations.

- *Acmella paniculata* (DC.) R.K.Jansen, Bhowmik and Datta 488; APA; Asteraceae; *Muraghati*; Tender shoots; The plant extract is applied locally on boils for quick healing by the Tripuri tribe and the tender shoot is chewed during tooth ache.
- *Acorus calamus* Linnaeus, Bhowmik and Datta 365; ACA; Acoraceae; *Boch*; Whole plant; Used during dysentery, dyspepsia and fever; The dried powder of aromatic rhizome is given orally twice a day.
- *Alternanthera philoxeroides* (Martius) Grisebach, Bhowmik and Datta 421; APIA; Amaranthaceae; *Jol Daroga*; Young tender shoots. The decoction of the young shoot is taken in empty stomach twice a day to treat dysentery.
- *Alternanthera sessilis* Roxburgh, Bhowmik and Datta 401; ASA; Amaranthaceae; *Haiccha*; Whole plant, the whole plant is used to treat asthma; *Dosage*: The leaf and root extract is given orally thrice a day.



Fig. 2:

- *Bacopa monnieri* (Linnaeus) Pennell, Bhowmik and Datta 363; BMS; Scrophulariaceae; *Brahmi*. Leaves; The decoction of the leaves is mixed with honey and taken orally to enhance memory power and to strengthen nervous system.
- *Centella asiatica* (Linnaeus) Urban, Bhowmik and Datta 483; CAA; Apiaceae; *Thankuni*; Leaves; The paste of the leaves are taken with rice to treat dysentery. Leaf juice is taken orally to treat gastritis and as liver stimulant (Fig. 2).
- *Commelina benghalensis* Linnaeus, Bhowmik and Datta, 277; CBC; Commelinaceae; *Kansire/Kanailota*; Leaves, the leaf juice is locally dropped in ear to get relief from earache; the shoot juice is also dropped to get relief from eye inflammation. *Dosage*: Twice in a day.
- *Eclipta alba* (Linnaeus) Hasskarl, Bhowmik and Datta, 235; EAA; Asteraceae; *Kesuti*; Leaves; *Uses*: The leaf extract is used as hair tonic, the leaf juice is applied on hair twice in a week.
- *Enhydra fluctuans* Loureiro, Bhowmik and Datta 473; Asteraceae; EFA; *Helencha*; Young twigs, the juice of the young twigs are taken orally to treat blood dysentery (Fig. 3).
- *Euyale ferox* Salisb, Bhowmik and Datta 462; Nymphaeaceae; EFN; *Makhna*; Seeds and Aril; The seeds are used against skin disorder (Fig. 4).
- *Hydrocotyl sibthorpioides* Lamarck, Bhowmik and Datta, 273; HAS; Apiaceae; *Bhuimoni*; Whole plant; The leaf is used during blood dysentery by Jamatia the leaf paste is given orally twice a day.



Fig. 3:



Fig. 4:



Fig. 5:



Fig. 6:

- *Hygrophila auriculata* (Schumacher) Heine, Bhowmik and Datta 413; HAA; Acanthaceae; Kule khara; Leaves; The decoction of the young leaves are taken orally for two consecutive weeks in empty stomach to treat anemia (Fig. 5).
- *Ipomoea aquatica* Forster, Bhowmik and Datta 417; IAC; Convolvulaceae; Kalmi; Young twigs; Special type of curry is prepared with young twigs and taken with rice during blood dysentery and also treat indigestion.
- *Ludwigia adscendens* (Linnaeus) Hara, Bhowmik and Datta 495; LAO; Onagraceae; Gaura sag; Whole plant; Leaf decoction with black pepper is taken orally for stomach pain and for the treatment of intestinal worms.
- *Monochoria hastata* (Linnaeus) Sloms, Bhowmik and Datta 475; MHP; Pontederiaceae; Kachari; Young tender shoots; The plant extract is applied locally on boils for quick healing by the Tripuri tribe, the decoction of the shoot is given orally once in a day (Fig. 6).
- *Monochoria vaginalis* (Burm. f.) Presler, Bhowmik and Datta 474; MVP; Pontederiaceae; Vansha kachu / Chichiri; used: Young tender shoots; Gastritis, tooth ache, asthma, nausea and in digestive disorders the paste of the young shoot is given orally twice in a day (Fig. 7).
- *Nelumbo nucifera* Gaertner, Bhowmik and Datta 431; NNN; Nelumbonaceae; Padma; Root; Root paste is used to treat piles, the root paste along with lemon juice is orally taken early in empty stomach for a week.



Fig. 7:

- *Neptunia prostrata* (Lamarck) Baillon, Bhowmik and Datta 482; NPM; Mimosaceae; Khorai Sag; Leaves, Young tender shoots; Half glass of leaf decoction is taken orally about a fortnight to treat dysuria (burning sensation during urine pass); The decoction of the young twigs are taken with common salt to treat white discharge.

- *Nymphaea rubra* Roxburgh ex Andrews, Bhowmik and Datta 453; NRN; Nymphaeaceae; Lal saluk; Petiole; Used to increase haemoglobin level, once in a day for a week.
- *Persicaria hydropiper* (Linnaeus) Spach, Bhowmik and Datta 465; PHP; Polygonaceae; Biskatali; Seeds and Leaves; Used as diuretic, also useful in amenorrhea.

Phytochemical Screening: Total 20 species were screened for their phytochemical content. The result is shown in Table 1. The analytical results of the qualitative analysis of the medicinal plants revealed some differences in their constituent property. Phytochemical analysis conducted on the plant extracts revealed the presence of constituents which are known to exhibit medicinal as well as physiological activities [23]. Analysis of the plant extracts revealed the presence of phytochemicals such as phenols, tannins, flavonoids, saponins, glycosides, steroids, terpenoids and alkaloids. The biological function of alkaloids and their derivatives are very important and are used in analgesic, antispasmodic and bactericidal activities. However, alkaloids are mainly observed in large amount in flowering plants and they have an important physiological effect on mankind [24].

Table 1: Phytochemical Screening of Ethno medicinal important hydrophytes and Marsh Plants of Tripura, India

Sl No	Plant Code	Alkaloid	Glycoside	Terpenoid	Steroid	Flavonoid	Tannins	Saponin	Phytobumins
1.	APA	+	+	-	+	+	-	+	-
2.	ACA	+	+	+	+	+	+	+	-
3.	APIA	+	+	-	+	+	-	+	+
4.	ASA	+	+	+	+	+	-	+	+
5.	BMS	+	+	+	+	+	-	+	-
6.	CAA	+	+	+	+	+	+	+	+
7.	CBC	+	+	-	+	+	+	+	-
8.	EAA	+	+	-	+	+	+	+	+
9.	EFA	+	+	+	+	+	+	+	+
10.	EFN	+	+	+	+	+	-	+	-
11.	HAS	+	+	+	+	+	+	+	+
12.	HAA	+	+	+	+	+	+	+	+
13.	IAC	+	+	+	+	+	-	+	+
14.	LAO	+	+	-	+	+	-	+	+
15.	MHP	+	+	+	+	+	-	+	-
16.	MVP	+	+	+	+	+	-	+	+
17.	NNN	+	+	+	+	+	+	+	+
18.	NPM	+	+	+	+	+	+	+	+
19.	NRN	+	+	+	+	+	+	+	+
20.	PHP	+	+	+	+	+	+	+	+

Flavonoids are hydroxylated phenolic substances known to be synthesized by plants in response to microbial infection and they have been found to be antimicrobial substances against wide array of microorganisms *in vitro*. Their activity is probably due to their ability to complex with extracellular and soluble proteins and to complex with bacterial cell wall. Tannins bind to proline rich protein and interfere with protein synthesis [25]. Saponin are a special class of glycosides which have soapy characteristics [26]. It has the property of precipitating and coagulating red blood cells. Some of the characteristics of saponin include formation of forms in aqueous solution, haemolytic activity, cholesterol binding properties and bitterness.

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