

ORIGINAL ARTICLE

Ethnomedicinal Survey of Bheramara Area in Kushtia District, Bangladesh

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ABSTRACT

Traditional or folk medicinal practitioners (Kavirajes) administer primary healthcare to most of the rural population in Bangladesh. They utilize medicinal plants for various formulations to treat diverse ailments. The medicinal plants used by the Kavirajes vary considerably from region to region. The objective of the present study was to conduct an ethnomedicinal survey among the Kavirajes of Bheramara area, Kushtia district, Bangladesh. Informed consent was obtained and interviews were conducted of the Kavirajes with the help of a semi-structured questionnaire. Plant specimens as pointed out by them were collected and identified at the Bangladesh National Herbarium. The survey resulted in obtaining names of 58 plant species used by Kavirajes for treatment of various ailments. These medicinal plants belong to 38 families. The Leguminosae family provided the largest number of species (5), followed by the Euphorbiaceae family (4 species). The various plant parts used included whole plants, leaves, stems, roots, barks, flowers, fruits, and rhizomes. Evaluation of reported pharmacological activity studies on a number of plant species obtained in the present survey indicate that these plant species can potentially lead to discovery of novel compounds of pharmacological interest.

Key words: Ethnomedicinal survey, Bheramara, Kushtia district, Bangladesh, medicinal plants

Introduction

The use of plants for medicinal purposes date back a long time ago and probably happened when primitive people noticed that animals like chimpanzees partake of certain plants when they got sick. Sofowara (1982) reported that even around some 3000 years B.P., human beings were aware of the medicinal properties of plants. Historical surveys have indicated that the eastern region of the Mediterranean has always been a rich source of medicinal plants and that indigenous Arab medicine was a major contributor to the development of modern medicine in Europe (Saad *et al.*, 2005). A number of alternative medicine systems exist in the Indian subcontinent, of which the chief form is the Ayurvedic system of medicine. The Ayurveda, which has been claimed to date back to over 7000 years, contain description of 2000 plant species and their therapeutic potentials. Overall, the various alternative medicinal systems of India uses more than 7500 plant species Mukherjee and Wahile, (2006). Balick and Cox (1996) observed that a number of important modern pharmaceuticals have been derived from, or are plants used by indigenous people. Modern drugs like aspirin, atropine, ephedrine, digoxin, morphine, quinine, reserpine and tubocurarine are examples, which were originally discovered through observations of traditional cure methods of indigenous peoples Gilani and Rahman, (2005).

Bangladesh has also a rich history of traditional medicinal practices (alternately known as alternative or complementary medicine). Besides the established systems of Ayurveda and Unani, traditional medicinal

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practitioners in Bangladesh (known variously as Kavirajes or Vaidyas) follow their own system, which can be termed as 'folk medicinal system'. In folk medicine, each Kaviraj has his own unique formulations of medicinal plants based on partly his own experience and partly on the basis of plants growing in his own vicinity. This knowledge is rarely written down, but is closely guarded within the family and passed on from generation to generation. Each successive generation adds to the formulations, so that at the end of several generations, if the family still clings to the medicinal practice, a considerable amount of knowledge on the medicinal properties of plants is accumulated. Since this folk medicinal preparations and use of plants can vary considerably between the Kavirajes of different regions of the country, the objective of the present study was to conduct an ethnomedicinal survey among the Kavirajes of Bheramara area, Kushtia district, Bangladesh to learn about medicinal plants used in that region. Kushtia district of Bangladesh adjoins India and is well known for its folk medicinal practices.

Materials and methods

2.1. the Study Area:

Bheramara sub-district is located within Kushtia district, Bangladesh and falls roughly within 23°40' -24°10' N and 88°45' -89°20' E. The town of Bheramara has an area of 3.26 sq. km and a population of 20,676. Agriculture is the main occupation of the people and the major crops are paddy, wheat, mustard, sweet potato, sunflower, onion, garlic, betel leaf, tobacco, and sugarcane. The survey was conducted in Bheramara town and its immediate vicinity.

2.2. Data Collection and Sampling Techniques:

A total of six Kavirajes were interviewed for this survey. Informed consent was obtained from all Kavirajes and the survey was explained to them in details including the information that the survey results may be published internationally. The Kavirajes agreed to provide information on medicinal plants but requested that the exact formulations be not provided in the manuscript since that may cause financial losses to them when disseminated before a wide public. At their request, the Kavirajes were interviewed as a group and not separately. Semi-structured interviews based on note-taking while interviewing the informants (also known as guided field walk) as described by Martin (1995) and Maundu (1995) was followed in collecting the ethnomedicinal data. Briefly, in this system, the informant (Kaviraj) takes the observer on a guided field walk through areas from where he collects his medicinal plants during daytime. Medicinal plants are shown to the observer with a detailed description of their uses. The information was later cross-checked and every item verified in evening meetings held with the Kavirajes. Plant specimens, as pointed out by the informants (Kavirajes) were collected, pressed and dried on site. All collected specimens were later brought to the Bangladesh National Herbarium for complete identification.

Results and Discussion

Plants and Their Distribution into Families:

The result of the present study shows that 58 species of plants are used by the Kavirajes of Bheramara area in Kushtia district, Bangladesh. These medicinal plants belong to 50 genera and 38 families (Table 1). The Leguminosae family provided the largest number of species (5), followed by the Euphorbiaceae family (4). Not all plants were obtained from the wild. Several plants were cultivated for home consumption of fruits; the fruits were also sold commercially. These plants are *Spondias dulcis*, *Terminalia belerica*, *Terminalia chebula*, *Diospyros discolor*, *Phyllanthus emblica*, *Tamarindus indica*, *Syzygium aqueum*, *Syzygium cumini*, *Citrus acida*, *Citrus grandis*, *Punica granatum* and *Capsicum annum*. Three plants, namely *Eryngium foetidum*, *Curcuma longa* and *Zingiber officinale* were also cultivated for use as spices. Several other plants were also occasionally grown around homesteads either for their medicinal properties or as ornamentals. These plants include *Andrographis paniculata*, *Aloe vera*, *Polyalthia longifolia*, *Catharanthus roseus*, *Calendula officinalis*, *Codiaeum variegatum*, *Ocimum gratissimum*, *Ocimum tenuiflorum*, *Hibiscus rosa chinensis*, *Azadirachta indica*, and *Bougainvillea spectabilis*.

Plant Parts Used and Mode of Preparation:

The various plant parts used included whole plants, leaves, stems, roots, barks, flowers, fruits, and rhizomes. In total, 71 uses of whole plants or plant parts were reported for the 58 species collected in the present survey. Table 2 displays the results on medicinal plant parts used to treat various ailments. Leaves and

roots formed the part of the plant most frequently used followed by fruits and whole plant. The Kavirajes use several different types of preparation for a particular plant or plant part. To obtain the juice of a particular plant or plant part, it is crushed with the help of a shil-nora (a flat slab of stone on which the plant is repeatedly crushed with another long and rounded stone) or a haman-dista (tall iron mortar with iron pestle). The crushed plant or plant part is then strained through cloth and the juice may be administered either orally or used for topical applications. For topical applications, the juice is usually mixed with various oils. For instance, to treat rheumatic pain, juice obtained from the leaves of *Cordyline fruticosa* is mixed with mustard oil and sesame seed oil and then applied to affected areas. The crushed leaves of *Codiaeum variegatum* are mixed with mustard oil and applied to affected areas as remedy for pain. To treat skin infections or snake and insect bites, the plant or plant part is simply crushed on a shil nora and the crushed parts applied onto the affected or bitten area. Crushed whole plant or plant parts may also be administered orally as is done for *Eryngium foetidum* (to treat indigestion). In cases of oral administration of juice, it may be mixed with sugar, sugarcane juice, molasses, milk, honey or salt to lessen the bitterness or make it more palatable (e.g. *Bombax ceiba*, *Tradescantia spathacea*, *Ipomoea quamoclit*, *Kalanchoe pinnata*, *Cycas rumphii*, *Coleus blumei*). Occasionally, whole plant or plant part may be crushed and mixed with a spice and then taken orally. Instances are *Mapania caudata* (crushed roots are taken with black cumin for helminthiasis) and *Aphanamixis polystachya* (roots and flowers are taken with coriander to reduce obesity).

Medical Applications:

It was observed that occasionally a single plant was used to treat a single ailment. However, a plant may also be used to multiple ailments, and a combination of plants may be used to treat a single ailment. *Ocimum tenuiflorum* presents an example where a single plant is used to treat diverse ailments like malaria, erectile dysfunction, coughs and colds. The fruits of *Citrus grandis* are also used as a carminative, to increase strength and for indigestion. Some examples of a single plant being used to treat a single ailment include *Cordyline fruticosa* (rheumatic pain), *Eryngium foetidum* (indigestion), *Bombax ceiba* (to increase sperm count), *Tradescantia spathacea* (blood in urine of women), *Ipomoea quamoclit* (passing of semen with urine), *Kalanchoe pinnata* (kidney stones), *Cycas rumphii* (debility), *Diospyros discolor* (diabetes), *Codiaeum variegatum* (pain), *Smilax china* (erectile dysfunction), and *Cissus quadrangularis* (bone fracture).

It was observed that for treatment of complicated or serious ailments, the Kavirajes usually use a combination of plants. For instance, to treat snake bites, roots of *Morinda citrifolia* are mixed with roots of *Polyalthia longifolia* and rhizomes of *Curcuma longa* and administered orally. For treatment of erectile dysfunction, the fruits of *Terminalia belerica*, *Terminalia chebula*, and *Phyllanthus emblica* are mixed with roots of *Abrus precatorius* and administered with cow milk. As an antidote to poison or for gall bladder pains, the leaves and roots of *Desmodium motorium*, *Uraria picta* and *Aristolochia indica* are crushed and the juice taken orally.

Eight plants were used to treat gastrointestinal disorders (including bloating, constipation, indigestion, dysentery) and eight plants were also used as sex stimulant or to treat impotency (including erectile dysfunction). Seven plants were used to treat skin infections, six to treat reproductive and urinary tract problems, and five to treat gall bladder problems or cough, cold, mucus and fever. Four plants were used to treat weakness and three plants as remedy for sexually transmitted diseases like gonorrhoea or syphilis.

Discussion:

Leaves and roots generally form the most frequently used plant parts in traditional medicine (Giday *et al.*, 2003; Wondimu *et al.*, 2007). Our survey results showed a similar profile of plant parts used in Bheramara area, where leaves or roots formed 29.58% each of the total uses (71). Fruits formed 15.49% of the uses, while whole plant use formed 14.08% of the total uses. It is interesting to note that seeds were not at all used by the Kavirajes of this area.

A number of plants used by the Kavirajes of Bheramara area are also reported to be used in the traditional medicinal systems in other parts of the world, although the ailments treated may be different. Some of the uses have also been validated through modern scientific research. *Andrographis paniculata* and *Aristolochia indica* is used by indigenous groups of southern parts of Tamilnadu, India for treatment of snake bite (Samy *et al.*, 2008). *Andrographis paniculata* is used by the Kavirajes of Bheramara to treat helminthiasis, dysentery, rectal diseases, coughs, colds, mucus and fever, as well as an antidote to poison. A preliminary study conducted in the United States of America concluded that *Andrographis paniculata* may help in the prevention and treatment of colds Roxas and Jurenka (2007). Administration of this plant also reportedly decreased nasal secretion in upper respiratory tract-infected children Carr and Nahata (2006). *Aloe vera* is considered a medicinal plant in

South Africa and various *Aloe* species are used in that country for treatment of infections, internal parasites, digestive ailments and injuries (Graee *et al.*, 2008). The Kavirajes of Bheramara use the plant to treat constipation. Traditional Chinese medicine uses the plant for treatment of inflammatory bowel disease Langmead and Rampton, (2006). In the ethnomedicine of Trinidad and Tobago, the plant is used to treat hypertension Lans, (2006).

Table 1: Listing of medicinal plants obtained from the traditional medicinal practitioners of Bheramara area, Kushtia district, Bangladesh.

Serial Number	Scientific Name	Family Name	Local Name	Utilized Part	Ailment/Uses/Side-effects/Precautions
1	<i>Andrographis paniculata</i> Nees.	Acanthaceae	Kalo-megh	Whole plant	Anthelmintic, dysentery, rectal diseases, cough, cold, mucus, fever. Whole plant juice is taken with molasses or sugar. Side-effects: too much medication can lead to large intestinal worms.
2	<i>Cordyline fruticosa</i> (L.) Goepf.	Agavaceae	Chaya-bon	Leaf	Rheumatic pain. Leaf juice is mixed with mustard oil, sesame seed oil and applied to affected areas. Side-effects: may cause coughs, colds and mucus.
3	<i>Aloe vera</i> L.	Aloaceae	Ghrito-kumari	Leaf	Constipation. Inner portions of leaf are taken with water.
4	<i>Spondias dulcis</i> Sol. ex Parkinson	Anacardiaceae	Amra	Fruit	Increase eye sight and decrease eye infections (stye disease, Bangla: anjali). Crushed fruits are taken.
5	<i>Polyalthia longifolia</i> (Sonn.) Thwaites (PL)	Annonaceae	Devdaru	Whole plant, root	Skin infections, snake bite. Crushed whole plant is applied to skin infections. Roots of <i>Morinda citrifolia</i> are mixed with <i>Polyalthia longifolia</i> roots and rhizomes of <i>Curcuma longa</i> and taken as remedy for snake bite. Side-effects: there will be more desire for urination.
6	<i>Eryngium foetidum</i> L.	Apiaceae	Dhonia	Leaf, root, fruit	Indigestion. Leaves, roots and fruits are crushed and taken. Side effects: may cause hardening of stool.
7	<i>Catharanthus roseus</i> (L. G. Don.	Apocynaceae	Noyon-tara	Leaf	Toothache. Leaves are chewed. Side-effects: may cause salivation.
8	<i>Aristolochia indica</i> L.	Aristolochiaceae	Ishwarmul	Leaf, root	Gall bladder pain, skin infections, antidote to poison. Leaves and roots of <i>Desmodium motorium</i> , <i>Uraria picta</i> and <i>Aristolochia indica</i> are crushed and the juice taken as remedy. Precautions: yoghurt must be taken after the medication.
9	<i>Calendula officinalis</i> L.	Asteraceae	Ganda	Leaf juice	Ear ache, skin infections, insect bite. Leaf juice is applied to ears or applied to infections and insect bites.
10	<i>Stereospermum suaveolens</i> DC.	Bignoniaceae	Nil-parul	Leaf	Gonorrhoea. Leaves are mixed with sugar cane molasses and water and taken. Precautions: patient should not take salty or hot food while on this medication.
11	<i>Bombax ceiba</i> L.	Bombacaceae	Shimul	Root	Increase sperm count. Root juice is taken with sugar.
12	<i>Mesua ferrea</i> L.	Clusiaceae	Nageshwaar	Whole plant	Skin diseases.
13	<i>Terminalia bellerica</i> (Gaertn.) Roxb.	Combretaceae	Bohera	Fruit	Erectile dysfunction. The fruits of <i>Terminalia bellerica</i> , <i>Terminalia chebula</i> , and <i>Phyllanthus emblica</i> are mixed with <i>Abrus precatorius</i> root and taken with cow's milk.
14	<i>Terminalia chebula</i> Retz.	Combretaceae	Horitoki	Fruit	Erectile dysfunction. The fruits of <i>Terminalia bellerica</i> , <i>Terminalia chebula</i> , and <i>Phyllanthus emblica</i> are mixed with <i>Abrus precatorius</i> root and taken with cow's milk.
15	<i>Tradescantia spathacea</i> Sw.	Commelinaceae	Sthol-shapla	Leaf	Blood in urine of women (Bangla: rokto-prodor). Leaf juice is mixed with sugarcane juice and taken. Side-effects: may cause rheumatism.
16	<i>Ipomoea mauritiana</i> Jacq.	Convolvulaceae	Vhui-cumra	Root	Increase lactation. Crushed and powdered roots are taken. Precautions: when chewed directly may cause vomiting.
17	<i>Ipomoea quamoclit</i> L.	Convolvulaceae	Pushpo-rani	Root	Passing of semen with urine. Crushed roots are taken with sugar.
18	<i>Kalanchoe pinnata</i> (Lam.) Pers.	Crassulaceae	Pathorkuchi	Leaf	Kidney stones. The leaves are chewed with salt.
19	<i>Coccinia cordifolia</i> (L.) Cogn.	Cucurbitaceae	Telamoon,	Telakuchi	Leaf Whitish discharge in urine (men). Leaves are mixed with leaf juice of <i>Aegle marmelos</i> and molasses or sugar and taken. Side-effects: frequent medication can lead to loss of sexual strength.
20	<i>Cycas revoluta</i> Thunb.	Cycadaceae	Cycas	Whole plant	Skin infections. Leaves are crushed and applied to affected areas. Precautions: must not be applied too frequently.
21	<i>Cycas rumphii</i> Miquel	Cycadaceae	Moni-raaj	Root tops	Debility. Root tops are crushed and taken with sugar or milk. Side-effects: may cause mucus in stool.
22	<i>Mapania caudata</i> Kük.	Cyperaceae	Chiruni-bahar	Root	Anthelmintic. Roots are crushed with black cumin (<i>Nigella sativa</i> seed) and taken. May cause frequent stool.
23	<i>Diospyros discolor</i> Willd.	Ebenaceae	Bilati-gab	Fruit	Diabetes. Ripe fruits are taken.
24	<i>Codiaeum variegatum</i> (L.) A.Juss.	Euphorbiaceae	Pata-bahar	Leaf	Pain. Crushed leaves are applied with mustard oil to affected areas. Side-effects: may cause rheumatism and gall bladder problems.

Table 1: Continue

25	<i>Euphorbia antiquorum</i> L.	Euphorbiaceae	Kata-shaz	Stem	Cuts and wounds. Stem juice is applied to cuts and wounds. Side-effects: may cause ulceration of stomach.
26	<i>Euphorbia tirucalli</i> L.	Euphorbiaceae	Dood-kora	Leaf, stem	Increase lactation in cows and buffaloes. Leaves and stems are fed to cattle.
27	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Amloki	Fruit	Erectile dysfunction. The fruits of <i>Terminalia belerica</i> , <i>Terminalia chebula</i> , and <i>Phyllanthus emblica</i> are mixed with <i>Abrus precatorius</i> root and taken with cow's milk.
28	<i>Abrus precatorius</i> L.	Fabaceae	Josthimodhu	Root	Erectile dysfunction. The fruits of <i>Terminalia belerica</i> , <i>Terminalia chebula</i> , and <i>Phyllanthus emblica</i> are mixed with <i>Abrus precatorius</i> root and taken with cow's milk.
29	<i>Mimosa diplotricha</i> C. Wright ex Sauvalle	Fabaceae	Lojjaboti	Root	Sex stimulant. Root juice is taken.
30	<i>Coleus blumei</i> Benth.	Lamiaceae	Chikunda	Root	Piles, blood coming out through rectum. Root juice is taken with sugar. Side-effects: may cause constipation and gall bladder pain.
31	<i>Ocimum gratissimum</i> L.	Lamiaceae	Radha-tulsi	Leaf	Colds, coughs. Leaves of <i>Ocimum gratissimum</i> and <i>Ocimum tenuiflorum</i> are crushed and the juice taken.
32	<i>Ocimum tenuiflorum</i> L.	Lamiaceae		Krishno-tulsi	Leaf, root Malaria, erectile dysfunction, coughs, colds. ½ inch roots are chewed with betel leaf as remedy for erectile dysfunction. 1 tola* leaf juice is taken for malaria. Leaf juice is taken with honey for coughs and colds.
33	<i>Cassia alata</i> L.	Leguminosae	Guru-chondal	Whole plant	Wet dream. Whole plants are crushed and the juice taken.
34	<i>Cassia occidentalis</i> L.	Leguminosae	Kalka-sunda	Leaf	Body poisoning, gall bladder problems, constipation. Leaf juice is taken with 1 tola* (approximately 1 teaspoonful) honey for gall bladder problems. Leaf juice is taken with warm water daily as remedy for constipation. 2 tolas* leaf juice is taken with cold water as remedy for body poisoning.
35	<i>Desmodium motorium</i> (Houtt.) Merrill	Leguminosae	Turok chondal	Leaf, root	Gall bladder pain, skin infections, antidote to poison. Leaves and roots of <i>Desmodium motorium</i> , <i>Uria picta</i> and <i>Aristolochia indica</i> are crushed and the juice taken. Precautions: yoghurt must be taken after the medication.
36	<i>Tamarindus indica</i> L.	Leguminosae	Tetul	Leaf	Syphilis, infections within the penis, difficulties in urination, burning sensations during urination. Leaves of <i>Tamarindus indica</i> are mixed with <i>Piper longum</i> leaves, crushed and the juice taken. Penis has to be cleaned with the help of a syringe.
37	<i>Uria picta</i> (Jacq.) DC.	Leguminosae	Rahu-chondal	Whole plant, leaf, root	Antidote to poison, skin infections. Also: leaves and roots of <i>Desmodium motorium</i> , <i>Uria picta</i> and <i>Aristolochia indica</i> are crushed and the juice taken as remedy for the above-mentioned ailments or gall bladder pain. Precautions: yoghurt must be taken after the medication.
38	<i>Asparagus racemosus</i> Willd.	Liliaceae	Shotomool	Whole plant	Stone lodged in penis, diabetes. Whole plant is mixed with rhizome of <i>Curcuma longa</i> and taken to get rid of stone deposition in penis. Plant juice is taken for diabetes. Side-effects: may cause vomiting.
39	<i>Curculigo orchoides</i> Gaertn.	Liliaceae	Taal-mool	Root	Passing of semen with urine. Roots are taken with sugar cubes. Side-effects: may cause excess sleeping.
40	<i>Punica granatum</i> L.	Lythraceae	Dalim	Fruit	Increase strength, debility. Fruit juice is taken.
41	<i>Hibiscus rosa sinensis</i> L.	Malvaceae	Rokto-joba	Flower	Menstrual disorders. Flowers are crushed in cold water and taken.
42	<i>Aphanamixis polystachya</i> (Wall.) R. Parker	Meliaceae	Piit-raaz	Root, flower	Obesity (Bangla: medh). The roots and flowers are taken with coriander (<i>Coriandrum sativum</i>) juice. Side-effects: may cause frequent urination.
43	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Neem	Leaf, root	Fever, fever arising from gall bladder disorders. Leaf and root juice is taken.
44	<i>Ficus hispida</i> L.f.	Moraceae	Full-dumur	Root	Gall bladder diseases. The roots are cooked with roots of <i>Citrus acida</i> , ginger and mustard oil and taken. Side-effects: may cause constipation.
45	<i>Syzygium aqueum</i> (Burm.f.) Alston	Myrtaceae	Jamrul		RootAnthelmintic. Roots are crushed and taken. Side-effects: may cause frequent urination.
46	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Jaam	Fruit, bark	Digestive aid, rheumatoid arthritis. Roots and bark is taken with salt. Side-effects: may cause chronic dysentery.
47	<i>Bougainvillea spectabilis</i> Willd.	Nyctaginaceae	Bagan-bilash	Leaf	Anthelmintic. Leaf juice is mixed with rhizomes of <i>Curcuma longa</i> and taken. Side-effects: may cause obesity and excessive sleeping.
48	<i>Piper longum</i> L.	Piperaceae	Pipul	Leaf	Syphilis, infections within the penis, difficulties in urination, burning sensations during urination. Leaves of <i>Tamarindus indica</i> are mixed with <i>Piper longum</i> leaves, crushed and the juice taken. Penis has to be cleaned with the help of a syringe.

Table 1: Continue

49	<i>Ixora coccinea</i> L.	Rubiaceae	Rongon	Leaf, root	Dysentery. Crushed leaves and roots are taken with ginger juice. Side-effects: may cause frequent urination.
50	<i>Morinda citrifolia</i> L.	Rubiaceae	Boro-chad	Root	Snake bite. Roots of <i>Morinda citrifolia</i> are mixed with <i>Polyalthia longifolia</i> roots and rhizomes of <i>Curcuma longa</i> and taken. Side-effects: there will be more desire for urination.
51	<i>Citrus acida</i> Roxb.	Rutaceae	Lebu	Fruit	Carminative, gall bladder diseases. Fruit juice is taken.
52	<i>Citrus grandis</i> (L.) Osbeck	Rutaceae	Jambura	Fruit	Increase strength, carminative, indigestion. Fruits are taken with salt. Side-effects: may cause loosening of stool.
53	<i>Smilax china</i> L.	Smilacaceae	Bili-hachra	Whole plant	Erectile dysfunction. Whole plant is taken.
54	<i>Capsicum annuum</i> L.	Solanaceae	Morich	Fruit	Vitamin C source, respiratory problems. Powdered fruits of <i>Capsicum annuum</i> are mixed with black pepper, lemon, and <i>Piper longum</i> root, crushed and the juice taken as remedy for respiratory problems.
55	<i>Cissus quadrangularis</i> L.	Vitaceae	Haar-jora	Stem	Bone fracture. Crushed stems are applied to fractures.
56	<i>Hedychium coronarium</i> J. König.	Zingiberaceae	Moyur-rupee	Leaf	Stomachache. Leaves are chewed.
57	<i>Curcuma longa</i> L.	Zingiberaceae	Holud	Rhizome	Snake bite. Roots of <i>Morinda citrifolia</i> are mixed with <i>Polyalthia longifolia</i> roots and rhizomes of <i>Curcuma longa</i> and taken as remedy for snake bite. Side-effects: there will be more desire for urination.
58	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Ada	Rhizome	Debility, digestive aid. Rhizomes are mixed with salt and taken after food.

*Tola. Local measure. 1 tola is approximately equivalent to 11.4g.

Note that some of the disease names are given in bold in the local (Bangla) language. The nearest equivalent English terminology for the disease is also given along with.

Table 2: Parts of medicinal plants used to treat various ailments.

Parts used	Number of species	Percentage
Whole plant	10	14.08
Leaf	21	29.58
Root	21	29.58
Rhizome	2	2.82
Bark	1	1.41
Stem	3	4.23
Flower	2	2.82
Seed	0	0.00
Fruit	11	15.49

Polyalthia longifolia is also considered a medicinal plant in India and its analgesic activity has been validated through scientific studies (Maiairajan *et al.*, 2006). The plant is used by the Bheramara Kavirajes to treat skin infections and snake bite. *Catharanthus roseus*, used by the Kavirajes to treat toothache, is considered an anti-diabetic plant in the ethnomedicine of Trinidad and Tobago Lans, (2006). *Azadirachta indica*, used by the Kavirajes to treat fever is also considered a medicinal plant in the traditional medicinal systems of India, and reportedly demonstrated anti-bacterial activity against six bacterial strains, namely *Pseudomonas testosteroni*, *Staphylococcus epidermidis*, *Klebsiella pneumoniae*, *Bacillus subtilis*, *Proteus morganii*, and *Micrococcus flavus* (Nair *et al.*, 2007). The plant thus may be of value against fever arising out of bacterial infections. In Oyo state of southwestern Nigeria, the plant is also used in their traditional medicine system to treat fever (Ajaiyeoba *et al.*, 2003). *Cassia alata*, used by the Kavirajes as remedy for wet dreams is considered a medicinal plant by the Caribs of Guatemala (Giron *et al.*, 1991).

Tamarindus indica is used by the Kavirajes for syphilis and urinary tract infections. This species is considered to possess considerable medicinal properties in a number of countries' traditional medicinal systems. It is considered a medicinal plant in Yemen where it is used to treat common infections. Scientific studies have shown that various extracts of the plant possess considerable anti-microbial activity, being active against three Gram-positive and two Gram-negative bacteria (Al-Fatimi *et al.*, 2007). The plant is also used to treat trypanosomiasis in Kaduna state of Nigeria (Atawodi *et al.*, 2002) and in North African countries to treat inflammation; its anti-inflammatory properties have also been validated through scientific studies (Rimbau *et al.*, 1999).

Traditional medicine has always been an excellent source for modern drug discoveries. Plants contain many chemical substances like terpenoids, alkaloids, flavonoids, saponins as well as other compounds, a number of which have now been identified by modern research to be effective drugs. Terpenoids for instance, which serves in plants as a chemical defense against environmental stress has been shown to suppress the process of inflammation and cancer (Salminen *et al.*, 2008). The use of turmeric in the traditional Ayurvedic medicine system of India and the traditional medicine system of China to treat inflammatory diseases dates back

thousands of years. Curcumin, a compound isolated from turmeric (*Curcuma longa*) has been shown to modulate a number of cellular targets and so has become a potential candidate to treat arthritis, diabetes, cardiovascular diseases, osteoporosis, Alzheimer's disease and cancer (Shishodia *et al.*, 2005). The 58 plant species as used by the Kavirajes of Bheramara have the potential for novel drug discoveries, which can serve as excellent remedies for a diverse number of ailments. At the same time, scientific validation of the various medicinal plant's use by the Kavirajes can go a long way towards conservation and cultivation of these plant species, some of which are getting endangered because of increase in human habitat.

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References

- Al-Fatimi, M., M. Wurster, G. Schröder and U. Lindequist, 2007. Antioxidant, antimicrobial and cytotoxic activities of selected medicinal plants from Yemen. *Journal of Ethnopharmacology*, 111: 657-666.
- Ajaiyeoba, E.O., O. Oladepo, O.I. Fawole, O.M. Bolaji, D.O. Akinboye, O.A. Ogundahunsi, C.O. Falade, G.O. Gbotosho, O.A. Itiola, T.C. Happi, O.O. Ebong, I.M. Ononiwu, O.S. Osowole, O.O. Oduola, J.S. Ashidi and A.M. Oduola, 2003. Cultural categorization of febrile illnesses in correlation with herbal remedies used for treatment in Southwestern Nigeria. *Journal of Ethnopharmacology*, 85: 179-185.
- Atawodi, S.E., D.A. Ameh, S. Ibrahim, J.N. Andrew, H.C. Nzelibe, E.O. Onyike, K.M. Anigo, E.A. Abu, D.B. James, G.C. Njoku and A.B. Sallau, 2002. Indigenous knowledge system for treatment of trypanosomiasis in Kaduna state of Nigeria. *Journal of Ethnopharmacology*, 79: 279-282.
- Balick, J.M. and P.A. Cox, 1996. *Plants, People and Culture: the Science of Ethnobotany*, Scientific American Library, New York, 228.
- Carr, R.R. and M.C. Nahata, 2006. Complementary and alternative medicine for upper-respiratory-tract infection in children. *American Journal of Health-System Pharmacy*, 63: 33-39.
- Gilani, A.H. and A.U. Rahman, 2005. Trends in ethnopharmacology. *Journal of Ethnopharmacology*, 100: 43-49.
- Giday, M., Z. Asfaw, T. Elmqvist and Z. Woldu, 2003. An ethnobotanical study of medicinal plants used by the Zay people in Ethiopia. *Journal of Ethnopharmacology*, 85: 43-52.
- Girón, L.M., V. Freire, A. Alonzo and A. Cáceres, 1991. Ethnobotanical survey of the medicinal flora used by the Caribs of Guatemala. *Journal of Ethnopharmacology*, 34: 173-187.
- Grace, O.M., M.S. Simmonds, G.F. Smith and A.E. van Wyk, 2008. Therapeutic uses of Aloe L. (Asphodelaceae) in southern Africa. *Journal of Ethnopharmacology*, 119: 604-614.
- Langmead, L. and D.S. Rampton, 2006. Review article: complementary and alternative therapies for inflammatory bowel disease. *Alimentary Pharmacology & Therapeutics*, 23: 341-349.
- Lans, C.A., 2006. Ethnomedicines used in Trinidad and Tobago for urinary problems and diabetes mellitus. *Journal of Ethnobiology and Ethnomedicine*, 2: 45.
- Mukherjee, P.K. and A. Wahile, 2006. Integrated approaches towards drug development from Ayurveda and other Indian system of medicines. *Journal of Ethnopharmacology*, 103: 25-35.
- Martin, G.J., 1995. *Ethnobotany: a 'People and Plants' Conservation Manual*, Chapman and Hall, London, 268.
- Maundu, P., 1995. Methodology for collecting and sharing indigenous knowledge: a case study. *Indigenous Knowledge and Development Monitor*, 3: 3-5.
- Malairajan, P., Geetha Gopalakrishnan, S. Narasimhan and K. Jessi Kala Veni, 2006. Analgesic activity of some Indian medicinal plants. *Journal of Ethnopharmacology*, 106: 425-428.
- Nair, R., T. Kalariya and S. Chanda, 2007. Antibacterial activity of some plant extracts used in folk medicine. *Journal of Herbal Pharmacotherapy*, 7: 191-201.
- Sofowora, A., 1982. *Medicinal Plants and Traditional Medicinal in Africa*. John Wiley and Sons, New York, 256.
- Saad, B., H. Azaizeh and O. Said, 2005. Tradition and perspectives of Arab herbal medicine: a review. *Evid Based Complementary & Alternative Medicine*, 2: 475-479.
- Samy, R.P., M.M. Thwin, P. Gopalakrishnakone and S. Ignacimuthu, 2008. Ethnobotanical survey of folk plants for the treatment of snakebites in Southern part of Tamilnadu, India. *Journal of Ethnopharmacology*, 115: 302-312.
- Salminen, A., M. Lehtonen, T. Suuronen, K. Kaarniranta and J. Huuskonen, 2008. Terpenoids: natural inhibitors of NF- κ B signaling with anti-inflammatory and anticancer potential. *Cellular and Molecular Life Sciences*, 65: 2979-2999.

- Shishodia, S., G. Sethi and B.B. Aggarwal, 2005. Curcumin: getting back to the roots. *Annals of the New York Academy of Sciences*, 1056: 206-217.
- Rimbau, V., C. Cerdan, R. Vila and J. Iglesias, 1999. Antiinflammatory activity of some extracts from plants used in the traditional medicine of north-African countries (II). *Phytotherapy Research*, 13: 128-132.
- Roxas, M. and J. Jurenka, 2007. Colds and influenza: a review of diagnosis and conventional, botanical, and nutritional considerations. *Alternative Medicine Review*, 12: 25-48.
- Wondimu, T., Z. Asfaw and E. Kelbessa, 2007. Ethnobotanical study of medicinal plants around 'Dheera' town, Arsi zone, Ethiopia. *Journal of Ethnopharmacology*, 112: 152-161.