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Medicinal Plants Used by Folk Medicinal Practitioners of Four Adjoining Villages of Narail and Jessore Districts, Bangladesh

Kakoli Rani Biswas, Tania Khan, Mirza Nipa Monalisa, Auditi Swarna, Tasneema Ishika, Mehreen Rahman, Mohammed Rahmatullah

Department of Pharmacy, University of Development Alternative, Dhanmondi, Dhaka-1205, Bangladesh

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ABSTRACT

A large segment of both the rural as well as the urban population of Bangladesh still relies on folk medicinal practitioners, otherwise known as Kavirajes, for treatment of various ailments. The Kavirajes rely on simple formulations of medicinal plants, which may be orally or topically administered for treatment. In our ongoing surveys on the medicinal plants used by Kavirajes throughout Bangladesh and the nature of formulations, we have observed considerable divergences in the use of plants and formulations. These differences exist up to the village level, which constitute the primary tier of human habitation in the country. The objective of the present study was to conduct an ethnomedicinal survey among the Kavirajes of five adjoining villages in Narail and Jessore districts of Bangladesh. A total of six Kavirajes were interviewed with the help of a semi-structured questionnaire and the guided field-walk method. It was found that the Kavirajes between themselves used a total of 46 plant species distributed in to 29 families in their treatments. Unlike other areas that have been surveyed and published in our previous reports, the Poaceae family contributed the highest number of medicinal plants with four plants. The Poaceae family was followed by the Arecaceae family, with three plants. The Kavirajes used decoctions, juices, and pastes of plant parts in their formulations. Leaves constituted the major plant part used, forming 38.8% of total uses. Roots and stems, respectively, contributed to 16.3% and 12.2% of total uses, followed by fruits at 8.2%. The Kavirajes did not treat a wide variety of ailments. Among ailments treated were menstrual problems, prolapse of uterus, fistula, diphtheria, helminthiasis, snake bite, pain, paralysis, skin disorders, bone fracture, rheumatism, respiratory tract disorders, gastrointestinal problems, spermatorrhea, allergy, insanity, internal bleeding, fever, and meho. The last ailment was referred to by the Kavirajes as urinary problem arising out from endocrinological disorders, particularly diabetes. An interesting feature of the Kavirajes of the villages surveyed was the frequent use of multiple plants for treatment of any specific ailment. The reason behind the use of multiple plants appeared to be that the Kavirajes took a holistic approach behind their treatment of ailments, where not only the ailment and its symptoms were treated, but also any underlying causes for the occurrence of the ailment in the first place. As such, socio-economic factors, as well as any underlying physical or mental tensions leading to the appearance of the ailment was also taken into account while prescribing plants, although sometimes plants were used in combination to provide a synergistic effect, or to negate the side-effects of the main plant used for treatment of a given ailment. It is our conclusion that these combinations of plants can prove useful for further scientific studies in the discovery of newer and more efficacious allopathic drugs.

Key words: Folk medicine, medicinal plants, Narail, Jessore, Bangladesh

Introduction

Villages form the primary unit of human habitation in Bangladesh. There are around 86,000 villages scattered over the country. Folk medicinal practitioners, otherwise known as Kavirajes, form the primary health-

Corresponding Author: Mohammed Rahmatullah, University of Development Alternative Dhanmondi R/A, Dhaka-1205 Bangladesh
E-mail: rahamatm@hotmail.com; Fax: 88-02-8157339

care providers to substantial segments of the rural population as well as the urban population of the country. There are two distinctive features of treatment by the Kavirajes. First, they use simple formulations of whole plants or plant parts in their treatment. Second, the approach of a Kaviraj for treatment of any particular ailment is holistic. That is, the Kavirajes do not only treat the symptoms but also try to ascertain any underlying cause(s) behind the appearance of the ailment. As such, physical or mental tensions arising from scarcity of financial resources, marital discord or other socio-economic factors are taken into account while preparing the plant formulation. Because of this holistic approach to treatment, the Kavirajes even as of present enjoy considerable trust and support from their patients. Even with the advent of modern, i.e. allopathic medicine, the Kaviraj profession is far from dying out, as attested by the presence of one to two Kavirajes in practically every village.

Bangladesh, because of its climate possesses over 5,000 plant species within a small area. The number of plants that are used for medicinal purposes is a matter of speculation, since any comprehensive survey of medicinal plants used by the Kavirajes have never been conducted in the country. To conduct such survey is an enormous and time-consuming task, especially considering the fact that there exist considerable variations in medicinal plant selection by the Kavirajes of even adjoining villages. On top of it, Bangladesh has over two dozen tribes with each tribe being divided into separate clans, with each clan having their own tribal medicinal practitioners. Over the last few years, we have been conducting surveys among Kavirajes of various regions of Bangladesh and tribal medicinal practitioners to gather data on medicinal plants used by the practitioners (Hossan *et al.*, 2010; Rahmatullah *et al.*, 2010; Nawaz *et al.*, 2009; Mia *et al.*, 2009; Hanif *et al.*, 2009; Nawaz *et al.*, 2009; Shahidullah *et al.*, 2009; Hossan *et al.*, 2009; Rahmatullah *et al.*, 2009). In our considered opinion, such collection of data is important as well as relevant for scientific purposes, because discovery of newer drugs for a number of ailments is becoming important either because there is no known cure in allopathic medicine, or existing allopathic drugs have serious side-effects, or have lost their significance because of evolvement of drug-resistant disease-causing vectors. Notably in this regard, is the fact that a large number of modern allopathic drugs owe their discovery through collecting data on indigenous uses of medicinal plants in different regions of the world (Cotton, 1996; Gilani and Rahman, 2005).

Considering the divergent choice of the Kavirajes regarding medicinal plants for treatment of ailments, it was the objective of the present study to conduct a survey among the Kavirajes of five adjoining villages in Narail and Jessore districts of Bangladesh to document the folk medicinal uses of plants in this area.

Materials and Methods

Narail and Jessore are two adjoining districts within Khulna Division of Bangladesh. The present survey was conducted in four adjoining villages of Narail district, namely Maijpara, Bahirdanga, Poradanga and Banshvita, and another adjoining village, which falls in Jessore district, namely Joyrabad. A total of six Kavirajes were interviewed in the five villages. Of them Kavirajes Sundra Nath Bokshi, Gauranga Biswas, Anil Biswas, Bibhuti Bhusan Roy, and Mohitosh Biswas were from Narail district villages, and Kaviraj Madhusudhan Biswas was from Joyrabad in Jessore district. Kaviraj Sundra Nath Bokshi was aged 60 years and had been practicing for 38 years. Kaviraj Gauranga Biswas was aged 50 years and according to him was practicing for the last 20-25 years. Kaviraj Anil Biswas was aged 55 years and had been practicing for a long time as he could remember. Kaviraj Bibhuti Bhusan Roy was aged 60 years and had been practicing since age 40. Kaviraj Mohitosh Biswas was aged 45 years and was in practice for the last 16 years. Kaviraj Madhusudhan Biswas was aged 55 years and had been in practice for the last 35-36 years.

Informed consent was obtained from all Kavirajes prior to the interviews. The Kavirajes proved to be very cooperative in not only providing the names of medicinal plants that they used for treatment of ailments, but also in providing detailed information on formulations and dosages. Interviews were conducted with the help of a semi-structured questionnaire and the guided field-walk method of Martin (Martin, 1995) and Maundu (Maundu, 1995). Briefly, in this method, the Kavirajes took the interviewers on guided field-walks through areas from where they usually collected their medicinal plants, pointed out the plants and described their uses along with providing the local names. All interviews were conducted in the Bengali language, the same language being spoken by both Kavirajes and interviewers. Plant specimens were collected, photographed and dried in the field. All plant specimens were identified by Mr. Manjur-ul-Kadir Mia, ex-Curator and Principal Scientific Officer, Bangladesh National Herbarium at Dhaka. Voucher specimens were deposited at the Plant Collection Wing of the University of Development Alternative.

Results and Discussion

A total of 46 plants distributed into 29 families were observed to be used by the Kavirajes of the area surveyed. The results are summarized in Table 1. An interesting aspect of the Kavirajes of the area surveyed was that the Poaceae family contributed the largest number of plants with four plants. Three plants were from the Arecaceae family, which is also a family from which plants were not frequently used by Kavirajes in other areas of Bangladesh surveyed by us thus far. For instance in Bheramara area of Kushtia district, the Leguminosae (Fabaceae) family provided the largest number of plant species, followed by the Euphorbiaceae family (Rahmatullah *et al.*, 2009). In Dhamrai sub-district of Dhaka district, the Araceae, Lamiaceae, Malvaceae and Solanaceae families contributed the highest number of plant species (Rahmatullah *et al.*, 2009). By contrast, in the present survey, the Fabaceae and the Euphorbiaceae families only provided two plants each and were not significant contributors compared to the Poaceae family. Any Araceae or Lamiaceae family plant was not used at all by the Kavirajes of Narail and Jessore districts in the villages surveyed, while the Malvaceae and Solanaceae families contributed two species each. Thus the present survey results differ significantly in the distribution of family-specific plants used by the Kavirajes.

A further interesting feature of the Kavirajes of the present survey area was the use of combinations of plants for treatment. For instance, treatment of excessive bleeding during menstruation involved four plant species, namely *Achyranthes aspera*, *Piper betle*, *Areca catechu*, and *Cayratia trifolia*. The same plant part from each plant was not used. The leaves of *Piper betle* and *Cayratia trifolia* were used along with the roots of *Achyranthes aspera* and fruits of *Areca catechu*. Also notable was that the formulation consisted of a two stage treatment. At first the root of *Achyranthes aspera* were chewed in combination with leaf of *Piper betle* and fruit of *Areca catechu* on an empty stomach; this was followed by consumption of fried *Cayratia trifolia* leaves with boiled rice. The use of boiled rice did not appear to have any clinical significance; rice was merely used as a medium for consumption of fried leaves of *Cayratia trifolia*. Whether *Piper betle* leaf and *Areca catechu* fruit also had any clinical significance is not clear. The people of Bangladesh are habituated to chewing betel (*Piper betle*) leaves with *Areca catechu* fruit (nuts). As such, this combination could also be a medium for intake of *Achyranthes aspera* root.

For treatment of prolapse of uterus, a total of five plants were used, namely *Abutilon indicum* (root), *Glycosmis pentaphylla* (root), *Eleusine indica* (root), *Amaranthus spinosus* (root), and *Piper nigrum* (fruit). Sugar was added to the mixture, presumably to make the formulation more palatable. For treatment of fistula, two plants were used, namely *Mangifera indica* (leaf) and molasses obtained from stem juice of *Saccharum officinarum*. The major plant used here is probably *Mangifera indica*, while the molasses may have been added to ensure palatability through imparting a sweet taste. However, it is to be noted that molasses are prepared in Bangladesh usually from two sources: stem juice of *Saccharum officinarum* and sap of *Phoenix sylvestris*. The latter is more costly, while the former, besides having a sweet taste, is also considered to have medicinal properties of its own. In the absence of scientific studies, it could not be ascertained about the real purpose of using molasses from *Saccharum officinarum* – to make *Mangifera indica* leaf juice more palatable or to add to its medicinal effect. If the intention was to make the *Mangifera indica* leaf juice more palatable, then molasses prepared from *Saccharum officinarum* would be the cheapest form available in Bangladesh, for both sugar or molasses prepared from sap of *Phoenix sylvestris* would be, in comparison, costly.

It is not that a combination of plants was used by the Kavirajes for treatment of all diseases. The swollen base of young plants of *Phoenix sylvestris* was used for treatment of helminthiasis. In this case juice obtained from macerated swollen base was mixed with lime water, i.e. water containing calcium hydroxide. Lime water has an alkaline nature; the alkalinity may be useful to dissolve particular phytochemical constituents from the base, which are effective against helminthic infections. The leaves and top of stems of *Eclipta prostrata* were used in combination with mustard oil for treatment of eczema. Since this process involved topical application, mustard oil may have been used to form a base for smoother application to the affected area. The oil can also serve a useful purpose in absorption of phytochemical(s) through the skin.

The fruit of the plant, *Piper nigrum*, had a variety of applications. In combination with *Morus indica*, *Zingiber officinale*, and *Brassica campestris*, it was used for treatment of bone fracture. In combination with *Achyranthes aspera*, the fruits were used for treatment of menstrual pain. In combination with *Abutilon indicum*, *Glycosmis pentaphylla*, *Eleusine indica*, and *Amaranthus spinosus*, the fruits were used for treatment of prolapse of uterus. The oil from the seeds of *Brassica campestris* were also used with other plants for treatment of diverse ailments by the Kavirajes, including bone fracture, muscle pain, joint pain, rheumatism, and coughs. However, in this latter case, the oil may be of secondary importance in treatment. For bone fracture, muscle pain, joint pain, and rheumatism, the oil was used in combination with other plant parts for topical application and may serve to form a base for even distribution over the affected area of other plant parts. For coughs, the other plant part (leaves of *Ficus heterophylla*) were fried in the oil and consumed with rice.

Leaves of *Punica granatum* and leaves of *Ficus heterophylla* were advised by the Kavirajes to be fried in oil and taken orally with warm rice. As previously mentioned for fried leaves of *Cayratia trifolia*, rice appeared in these two instances to merely serve as a medium for consumption of the leaves. The Kavirajes also felt that in all three instances observed, partaking of rice did not contribute to any additional medicinal benefits. The same cannot be said of table salt, which was added to roots of *Acalypha indica* and topically applied for treatment of pain in the middle of the forehead, and to leaves of *Phyllanthus nodiflora* and topically applied for treatment of muscular pain. In both instances, the common denominator was application for pain; as such table salt must be exerting possibly a synergistic action along with the other plant parts in having an analgesic effect. Scientific studies on medicinal plants used by indigenous people tend to converge on studies with the plant itself. It is possibly of importance that such studies be conducted with the plant along with adjunct studies of other substances used by the Kavirajes, i.e. the plants need to be studied not separately but in combination with other substances like table salt or molasses as done by the Kavirajes.

Two other terms need to be clarified in this section. The Kavirajes used *Acacia nilotica* to treat meho. Meho, although defined by the Kavirajes as urinary problems arising out from endocrinological disorders, particularly diabetes, is really a complex disease of which there is no known English equivalent. First of all, since the Kavirajes do not use any clinical diagnostic procedures in the modern sense, it is difficult to comprehend that they can diagnose endocrinological problems. So they rely on certain symptoms like urinary problems, which they term meho and distinguish it from other urinary problems like urinary incontinences or burning sensations during urination. Meho is a term frequently used by the Kavirajes of Bangladesh, and almost each Kaviraj has his or her own particular distinguishing symptoms for meho. That meho arises from endocrinological problems is a diagnosis made by allopathic doctors, who have treated the same patient diagnosed with meho by the Kavirajes. However, Kavirajes in other parts of Bangladesh, in our surveys, have also termed meho as symptomized by wasting away of the body, which may or may not reflect endocrinological disorders. The Kavirajes of the areas surveyed in the present study used ghee along with *Bombax ceiba*, *Zingiber officinale*, and *Anthocephalus chinensis* for treatment of bone fracture. Ghee is clarified butter, and is prepared by boiling butter till it forms a thick yellow grainy liquid with burnt residues remaining at the bottom of the heating pan. The residue is discarded and the liquid is strained through a piece of cloth and is then termed ghee. Ghee, at ambient temperature usually gels to a semi-solid form and is to be warmed up to bring it back to the liquid form.

In the present survey, it was observed that the Kavirajes mainly relied on leaves of plants in their treatment. Leaves constituted 38.8% of total uses, followed by roots at 16.3% and stems at 12.2%. Fruits constituted 8.2% of total uses. Flowers were not used at all. An interesting feature of plant parts used by the Kavirajes of the areas surveyed was the use of swollen base of plant, which they termed "motha". This is the part of the plant which lies immediately above the soil and extends to immediately below the soil.

The Kavirajes of the areas surveyed in the present study did not treat a large number of diseases as usually observed in our other studies. The various ailments treated were menstrual problems, prolapse of uterus, fistula, diphtheria, helminthiasis, snake bite, pain, paralysis, skin disorders, bone fracture, rheumatism, respiratory tract infections, gastrointestinal disorders, spermatorrhea, allergy, insanity, meho, internal bleeding, external bleeding, and fever. The number of plants used for treatment of any specific ailment was not indicative of the prevalence of the ailment, since combinations of plants were used in most cases for treatment of a specific ailment.

A comparison of the common plants used by the Kavirajes of Narail and Jessore district in the present study with that of plants used by Kavirajes of Kushtia district in an earlier study [9] highlights the considerable differences between the natures of use of medicinal plants in different areas of Bangladesh. Notably, Jessore and Narail districts are not far from Kushtia district, and all three districts have almost identical vegetation cover. To cite a few instances, *Aristolochia indica* was used by the Kavirajes of Narail and Jessore districts to treat snake bite; the same plant was used by the Kavirajes of Kushtia district for treatment of gall bladder pain, skin infections, and as an antidote to poison. *Bombax ceiba* was used by the Kavirajes of the present study for treatment of bone fracture, but used by Kavirajes of Kushtia district to increase sperm count. *Zingiber officinale* was used by the Kavirajes in the present study for treatment of bone fracture and rheumatism, while it was used by the Kavirajes of Kushtia district for treatment of debility and as a digestive aid. It is to be noted that the same plant part (rhizome) of *Zingiber officinale* was used in all treatments, whether be at Narail and Jessore or Kushtia district.

Medicinal plants used in the folk medicinal system of Bangladesh present opportunities for further scientific research from two points. The first relates to the diversity of plants. The second relates to the diversity of folk medicinal uses. On both these counts, modern scientific research can benefit as the plants present considerable opportunities for discovery of a variety of drugs that can be efficaciously used for treatment of diverse ailments, for which modern allopathic medicine has no satisfactory cure.

Table 1: Medicinal plants used by the Kavirajes of the five villages surveyed of Narail and Jessore districts, Bangladesh.

Serial Number	Scientific Name	Family Name	Local Name	Utilize Part	Ailment
1	<i>Achyranthes aspera</i> L.	Amaranthaceae	Sish akondo	Root	Excessive bleeding during menstruation. At first a 1.5 inch portion of root of <i>Achyranthes aspera</i> is taken with one leaf of <i>Piper betle</i> and one small fruit (nut) of <i>Areca catechu</i> , chewed and only the resulting juice swallowed on an empty stomach. Next, a handful of young leaves of <i>Cayratia trifolia</i> is fried thoroughly and taken with a handful of boiled rice, which is still warm. The process is repeated 2-3 times daily for 2-3 days. Menstrual pain. Juice from one root of <i>Achyranthes aspera</i> is mixed with one powdered fruit of <i>Piper nigrum</i> . The mixture is taken once daily on an empty stomach for 1 day only.
2	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Kanta notae	Root	Prolapse of uterus. Roots of <i>Abutilon indicum</i> are mixed with roots of <i>Glycosmis pentaphylla</i> , roots of <i>Eleusine indica</i> , and roots of <i>Amaranthus spinosus</i> and macerated. Sugar and 21 powdered fruits of <i>Piper nigrum</i> are then added to the macerated mix and 42 pills are prepared from the mixture. One pill is to be taken with 1 cup of water thrice daily for 14 days.
3	<i>Mangifera indica</i> L.	Anacardiaceae	Aam	Leaf	Fistula. One cup of juice obtained from macerated <i>Mangifera indica</i> leaves is mixed with 100g molasses prepared from juice of <i>Saccharum officinarum</i> and taken once daily on an empty stomach for 7 days.
4	<i>Lannea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	Kocha	Top of stem	Spermatorrhea. 100 top of stems of <i>Cynodon dactylon</i> are mixed with 3 top of stems of <i>Lannea coromandelica</i> and then macerated with a little bit of water. Juice obtained from the macerated mixture is then mixed with molasses and taken in the morning on an empty stomach for 1 week.
5	<i>Areca catechu</i> L.	Arecaceae	Shupari	Fruit (nut)	Excessive bleeding during menstruation. At first a 1.5 inch portion of root of <i>Achyranthes aspera</i> is taken with one leaf of <i>Piper betle</i> and one small fruit (nut) of <i>Areca catechu</i> , chewed and only the resulting juice swallowed on an empty stomach. Next, a handful of young leaves of <i>Cayratia trifolia</i> is fried thoroughly and taken with a handful of boiled rice, which is still warm. The process is repeated 2-3 times daily for 2-3 days.
6	<i>Cocos nucifera</i> L.	Arecaceae	Narikel	Fruit pulp (coconut milk)	Diphtheria. For emergency treatment of diphtheria, 1 kg amount of coconut milk is used. To prepare coconut milk, pulp from a medium sized fruit is added to 1 liter of water and the pulp thoroughly smashed in the water.
7	<i>Phoenix sylvestris</i> L.	Arecaceae	Khejur	Swollen base of young plant (motha)	Helminthiasis. Two swollen bases from young plants are macerated with water. 2-3 teaspoonful of juice obtained from the macerated mixture is mixed with lime water (water containing calcium hydroxide) and taken in the morning on an empty stomach for 2-3 days.
8	<i>Aristolochia indica</i> L.	Aristolochiaceae	Iche	Leaf	Snake bite. Several leaves of <i>Aristolochia indica</i> are mixed with 2-3 fruits of <i>Piper nigrum</i> , macerated and the juice obtained is orally administered immediately.
9	<i>Calotropis gigantea</i> (L.) Ait.f.	Asclepiadaceae	Akondo	Leaf	Muscle pain, joint pain. The leaves of <i>Calotropis gigantea</i> have a white powdery substance on the surface. The powder is rubbed off from one leaf, and a few drops of oil obtained from seeds of <i>Brassica campestris</i> is put on the leaf. The leaf is then warmed over a coal fire or fire in which rice bran is burnt. When the oil starts bubbling, the leaf is taken from the fire and cooled till it is slightly warm. The warm leaf is applied to painful areas. The process is repeated 3-4 times daily till cure. Paralysis. 2-4 leaves of <i>Calotropis gigantea</i> , 1 handful of leaves of <i>Zizyphus mauritiana</i> , 2-3 inch of bark of <i>Terminalia arjuna</i> , and 2-3 leaves of <i>Datura metel</i> are cut into pieces and boiled in water. The water is next cooled and while still warm is applied to paralyzed portions of the body 3-4 times daily. The procedure is repeated each day till cure.

Table 1: Continue

10	<i>Eclipta prostrata</i> L.	Asteraceae	Khudkhaste	Leaf, top of stem	Eczema. Leaves and top of stems are macerated followed by warming up the macerated portion with mustard oil till the water has gone totally dry. The decoction is then poured in a small bottle. Portions of the decoction are applied to affected areas 2-3 times daily till cure.
11	<i>Bombax ceiba</i> L.	Bombacaceae	Shimul	Bark of root	Bone fracture. First bark from roots of mature trees of <i>Bombax ceiba</i> is macerated with raw cow milk and rhizomes of <i>Zingiber officinale</i> to form a paste. The paste is applied thickly over the fractured area and bandaged with leaves of <i>Anthocephalus chinensis</i> . If there is too much fracture, the area should be straightened with a splint. After 24 hours, the bandage is removed. After the bandage has been taken off, the fractured area is ribbed with old ghee (clarified butter from cow milk). The area is then bandaged with a piece of cloth till mended.
12	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Combretaceae	Arjun	Bark	Paralysis. 2-4 leaves of <i>Calotropis gigantea</i> , 1 handful of leaves of <i>Zizyphus mauritiana</i> , 2-3 inch of bark of <i>Terminalia arjuna</i> , and 2-3 leaves of <i>Datura metel</i> are cut into pieces and boiled in water. The water is next cooled and while still warm is applied to paralyzed portions of the body 3-4 times daily. The procedure is repeated each day till cure.
13	<i>Brassica campestris</i> L.	Cruciferae	Shorisha	Seed oil	Bone fracture. One handful of leaves of <i>Morus indica</i> is mixed with 50g rhizomes of <i>Zingiber officinale</i> , 20 fruits of <i>Piper nigrum</i> , and 25-30 drops of oil prepared from seeds of <i>Brassica campestris</i> and macerated thoroughly. The mixture is then applied to fractured area as a thick paste and bandaged with a piece of cloth. A fresh mixture is applied and bandaged for 7 days. Muscle pain, joint pain. The leaves of <i>Calotropis gigantea</i> have a white powdery substance on the surface. The powder is rubbed off from one leaf, and a few drops of oil obtained from seeds of <i>Brassica campestris</i> is put on the leaf. The leaf is then warmed over a coal fire or fire in which rice bran is burnt. When the oil starts bubbling, the leaf is taken from the fire and cooled till it is slightly warm. The warm leaf is applied to painful areas. The process is repeated 3-4 times daily till cure. Rheumatism. 75g rhizomes of ginger (<i>Zingiber officinale</i>), 100g of garlic (<i>Allium sativum</i>) and 85g of onions (<i>Allium cepa</i>) are macerated together to extract the juice. To the juice is added 86g atosh (root of an unidentified plant) and an equal amount of darmuz (arsenic), mudra shankar (unidentified chemical, possibly a chromium salt) and camphor. One powdered seed of <i>Datura stramonium</i> is added to the mixture along with 400 g of oil from seeds of <i>Brassica campestris</i> . The whole amount is boiled thoroughly, slightly cooled and applied to places where there is rheumatic pain. This is done 2-3 times daily till cure of the pain. Coughs. One handful of leaves of <i>Ficus heterophylla</i> is fried in oil obtained from seeds of <i>Brassica campestris</i> , macerated and taken with warm rice. The procedure is repeated daily till cure.
14	<i>Cyperus rotundus</i> L.	Cyperaceae	Vadla	Swollen portion	Indigestion, flatulence. 3-4 swollen parts of roots are macerated to obtain juice. The juice is taken with water in the morning on an empty stomach for 4-5 days.
15	<i>Acalypha indica</i> L.	Euphorbiaceae	Biral kandani	Root	Pain in the middle of the forehead. One root is macerated with a little table salt and lightly applied to the forehead once daily till cure.
16	<i>Phyllanthus acidus</i> (L.) Skeels	Euphorbiaceae	Royal, Ar-boroi	Leaf	Allergy. Several leaves are macerated to obtain juice. The juice is both orally administered as well as topically applied to swellings at different places die to allergy.

Table 1: Continue

17	<i>Abrus precatorius</i> L.	Fabaceae	Kuch	Fruit	Insanity. Half of one fruit is macerated and mixed with water to form 2-3 teaspoonfuls. The mixture is then administered through the nose with the help of a pipe. The procedure is repeated daily till cure.
18	<i>Acacia nilotica</i> (L.) Delile	Fabaceae	Babla	Leaf, gum	Meho (generally denotes urinary problems arising from endocrinological disorders, particularly diabetes). Juice obtained from 1 handful of leaves is taken every morning on an empty stomach for 7-15 days. Alternately, a little amount of gum is soaked in water, thoroughly stirred and taken in the morning on an empty stomach for 7-15 days.
19	<i>Allium cepa</i> L.	Liliaceae	Peyaz	Bulb	Rheumatism. 75g rhizomes of ginger (<i>Zingiber officinale</i>), 100g of garlic (<i>Allium sativum</i>) and 85g of onions (<i>Allium cepa</i>) are macerated together to extract the juice. To the juice is added 86g atosh (root of an unidentified plant) and an equal amount of darmuz (arsenic), mudra shankar (unidentified chemical, possibly a chromium salt) and camphor. One powdered seed of <i>Datura stramonium</i> is added to the mixture along with 400 g of oil from seeds of <i>Brassica campestris</i> . The whole amount is boiled thoroughly, slightly cooled and applied to places where there is rheumatic pain. This is done 2-3 times daily till cure of the pain.
20	<i>Allium sativum</i> L.	Liliaceae	Roshun	Bulb	Rheumatism. 75g rhizomes of ginger (<i>Zingiber officinale</i>), 100g of garlic (<i>Allium sativum</i>) and 85g of onions (<i>Allium cepa</i>) are macerated together to extract the juice. To the juice is added 86g atosh (root of an unidentified plant) and an equal amount of darmuz (arsenic), mudra shankar (unidentified chemical, possibly a chromium salt) and camphor. One powdered seed of <i>Datura stramonium</i> is added to the mixture along with 400 g of oil from seeds of <i>Brassica campestris</i> . The whole amount is boiled thoroughly, slightly cooled and applied to places where there is rheumatic pain. This is done 2-3 times daily till cure of the pain.
21	<i>Punica granatum</i> L.	Lythraceae	Dalim	Leaf	Dysentery (symptoms: stomach pain with stool, excessive defecation, presence of mucus with stool). One handful of leaf is washed and then fried in oil. The fried leaves are then taken immediately with warm rice before meal. This is continued 2-3 times daily or till cure. Side effects: may induce constipation.
22	<i>Abutilon indicum</i> (L.) Sweet	Malvaceae	Chapi tapri	Root	Prolapse of uterus. Roots of <i>Abutilon indicum</i> are mixed with roots of <i>Glycosmis pentaphylla</i> , roots of <i>Eleusine indica</i> , and roots of <i>Amaranthus spinosus</i> and macerated. Sugar and 21 powdered fruits of <i>Piper nigrum</i> are then added to the macerated mix and 42 pills are prepared from the mixture. One pill is to be taken with 1 cup of water thrice daily for 14 days.
23	<i>Sida acuta</i> Burm.f.	Malvaceae	Barela	Leaf	Uterine prolapse (Kaviraj term: kunari beron). One handful of leaves of <i>Sida acuta</i> is mixed with one root of <i>Aegle marmelos</i> and 2-3 inch bark of <i>Psidium guajava</i> , macerated and the juice obtained. Several drops of juice from <i>Bambusa tulda</i> is then added to the above mixture and taken daily on an empty stomach for 3-4 days.
24	<i>Ficus heterophylla</i> L.f.	Moraceae	Bola dumur	Leaf	Coughs. One handful of leaves of <i>Ficus heterophylla</i> is fried in oil obtained from seeds of <i>Brassica campestris</i> , macerated and taken with warm rice. The procedure is repeated daily till cure.
25	<i>Morus indica</i> L.	Moraceae	Tunth	Leaf	Bone fracture. One handful of leaves of <i>Morus indica</i> is mixed with 50g rhizomes of <i>Zingiber officinale</i> , 20 fruits of <i>Piper nigrum</i> , and 25-30 drops of oil prepared from seeds of <i>Brassica campestris</i> and macerated thoroughly. The mixture is then applied to fractured area as a thick paste and bandaged with a piece of cloth. A fresh mixture is applied and bandaged for 7 days.

Table 1: Continue

26	<i>Musa sapientum</i> L.	Musaceae	Bichi kola, Doya kola	Top portion of trunk	Stomach pain due to helminthiasis. The top portion of the trunk is excised and warmed slightly to extract juice. The juice is to be orally taken whenever stomach pain occurs. This is continued till cure.
27	<i>Psidium guajava</i> L.	Myrtaceae	Peyara	Bark	Uterine prolapse (Kaviraj term: kunari beron). One handful of leaves of <i>Sida acuta</i> is mixed with one root of <i>Aegle marmelos</i> and 2-3 inch bark of <i>Psidium guajava</i> , macerated and the juice obtained. Several drops of juice from <i>Bambusa tulda</i> is then added to the above mixture and taken daily on an empty stomach for 3-4 days (61).
28	<i>Sesamum indicum</i> L.	Pedaliaceae	Tiil	Leaf	Fistula (Kaviraj term: baushay). 3-4 leaves are squeezed thoroughly and applied to fistula.
29	<i>Piper betle</i> L.	Piperaceae	Paan	Leaf	Excessive bleeding during menstruation. At first a 1.5 inch portion of root of <i>Achyranthes aspera</i> is taken with one leaf of <i>Piper betle</i> and one small fruit (nut) of <i>Areca catechu</i> , chewed and only the resulting juice swallowed on an empty stomach. Next, a handful of young leaves of <i>Cayratia trifolia</i> is fried thoroughly and taken with a handful of boiled rice, which is still warm. The process is repeated 2-3 times daily for 2-3 days.
30	<i>Piper nigrum</i> L.	Piperaceae	Gol morich	Fruit	Bone fracture. One handful of leaves of <i>Morus indica</i> is mixed with 50g rhizomes of <i>Zingiber officinale</i> , 20 fruits of <i>Piper nigrum</i> , and 25-30 drops of oil prepared from seeds of <i>Brassica campestris</i> and macerated thoroughly. The mixture is then applied to fractured area as a thick paste and bandaged with a piece of cloth. A fresh mixture is applied and bandaged for 7 days. Menstrual pain. Juice from one root of <i>Achyranthes aspera</i> is mixed with one powdered fruit of <i>Piper nigrum</i> . The mixture is taken once daily on an empty stomach for 1 day only. Prolapse of uterus. Roots of <i>Abutilon indicum</i> are mixed with roots of <i>Glycosmis pentaphylla</i> , roots of <i>Eleusine indica</i> , and roots of <i>Amaranthus spinosus</i> and macerated. Sugar and 21 powdered fruits of <i>Piper nigrum</i> are then added to the macerated mix and 42 pills are prepared from the mixture. One pill is to be taken with 1 cup of water thrice daily for 14 days. Snake bite. Several leaves of <i>Aristolochia indica</i> are mixed with 2-3 fruits of <i>Piper nigrum</i> , macerated and the juice obtained is orally administered immediately.
31	<i>Bambusa tulda</i> Roxb.	Poaceae	Bans, Tulda bans, Jowa bans	Stem juice (juice flowing when top of stem is cut)	Uterine prolapse (Kaviraj term: kunari beron). One handful of leaves of <i>Sida acuta</i> is mixed with one root of <i>Aegle marmelos</i> and 2-3 inch bark of <i>Psidium guajava</i> , macerated and the juice obtained. Several drops of juice from <i>Bambusa tulda</i> is then added to the above mixture and taken daily on an empty stomach for 3-4 days.
32	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Durba, Durbo	Whole plant, top of stem	Internal bleeding (symptoms: passing of blood with urine or stool, blood with vomit, nose bleed, excessive passing of blood during menstruation), bleeding from external cuts and wounds. For internal bleeding, 1 handful of whole plant is squeezed to extract juice. 2-3 teaspoonful of juice is taken 2-3 times daily for 10-30 days. For external bleeding, paste of whole plant is applied to cuts and wounds. Note that the juice is to be used as soon as possible after preparation. Spermatorrhoea. 100 top of stems of <i>Cynodon dactylon</i> are mixed with 3 top of stems of <i>Lannea coromandelica</i> and then macerated with a little bit of water. Juice obtained from the macerated mixture is then mixed with molasses and taken in the morning on an empty stomach for 1 week.

Table 1: Continue

33	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	Kachra	Root	Prolapse of uterus. Roots of <i>Abutilon indicum</i> are mixed with roots of <i>Glycosmis pentaphylla</i> , roots of <i>Eleusine indica</i> , and roots of <i>Amaranthus spinosus</i> and macerated. Sugar and 21 powdered fruits of <i>Piper nigrum</i> are then added to the macerated mix and 42 pills are prepared from the mixture. One pill is to be taken with 1 cup of water thrice daily for 14 days.
34	<i>Saccharum officinarum</i> L.	Poaceae	Aakh	Stem juice	Fistula. One cup of juice obtained from macerated <i>Mangifera indica</i> leaves is mixed with 100g molasses prepared from juice of <i>Saccharum officinarum</i> and taken once daily on an empty stomach for 7 days. Spermatorrhoea. One inch size of stems of <i>Abroma augusta</i> are cut into 2-3 pieces and soaked in water. The water is then taken with molasses prepared from stem juice of <i>Saccharum officinarum</i> thrice daily for 7 days.
35	<i>Zizyphus mauritiana</i> Lam.	Rhamnaceae	Boroi	Leaf	Paralysis. 2-4 leaves of <i>Calotropis gigantea</i> , 1 handful of leaves of <i>Zizyphus mauritiana</i> , 2-3 inch of bark of <i>Terminalia arjuna</i> , and 2-3 leaves of <i>Datura metel</i> are cut into pieces and boiled in water. The water is next cooled and while still warm is applied to paralyzed portions of the body 3-4 times daily. The procedure is repeated each day till cure. Head ache. Leaves are macerated with a small amount of table salt, warmed slightly and applied to the side of the head where there is pain. This is to be continued till cure.
36	<i>Anthocephalus chinensis</i> (Lam.) A. Rich. Ex Walp.	Rubiaceae	Kodom	Leaf	Bone fracture. First bark from roots of mature trees of <i>Bombax ceiba</i> is macerated with raw cow milk and rhizomes of <i>Zingiber officinale</i> to form a paste. The paste is applied thickly over the fractured area and bandaged with leaves of <i>Anthocephalus chinensis</i> . If there is too much fracture, the area should be straightened with a splint. After 24 hours, the bandage is removed. After the bandage has been taken off, the fractured area is ribbed with old ghee (clarified butter from cow milk). The area is then bandaged with a piece of cloth till mended.
37	<i>Aegle marmelos</i> (L.) Corr.	Rutaceae	Bel	Root	Uterine prolapse (Kaviraj term: kunari beron). One handful of leaves of <i>Sida acuta</i> is mixed with one root of <i>Aegle marmelos</i> and 2-3 inch bark of <i>Psidium guajava</i> , macerated and the juice obtained. Several drops of juice from <i>Bambusa tulda</i> is then added to the above mixture and taken daily on an empty stomach for 3-4 days.
38	<i>Glycosmis pentaphylla</i> (Retz.) Corr.	Rutaceae	Aakhchoti	Root	Prolapse of uterus. Roots of <i>Abutilon indicum</i> are mixed with roots of <i>Glycosmis pentaphylla</i> , roots of <i>Eleusine indica</i> , and roots of <i>Amaranthus spinosus</i> and macerated. Sugar and 21 powdered fruits of <i>Piper nigrum</i> are then added to the macerated mix and 42 pills are prepared from the mixture. One pill is to be taken with 1 cup of water thrice daily for 14 days.
39	<i>Datura metel</i> L.	Solanaceae	Kalo dhutura	Leaf	Paralysis. 2-4 leaves of <i>Calotropis gigantea</i> , 1 handful of leaves of <i>Zizyphus mauritiana</i> , 2-3 inch of bark of <i>Terminalia arjuna</i> , and 2-3 leaves of <i>Datura metel</i> are cut into pieces and boiled in water. The water is next cooled and while still warm is applied to paralyzed portions of the body 3-4 times daily. The procedure is repeated each day till cure.
40	<i>Datura stramonium</i> L.	Solanaceae	Dhutura	Seed	Rheumatism. 75g rhizomes of ginger (<i>Zingiber officinale</i>), 100g of garlic (<i>Allium sativum</i>) and 85g of onions (<i>Allium cepa</i>) are macerated together to extract the juice. To the juice is added 86g atosh (root of an unidentified plant) and an equal amount of darmuz (arsenic), mudra shankar (unidentified chemical, possibly a chromium salt) and camphor. One powdered seed of <i>Datura stramonium</i> is added to the mixture along with 400 g of oil from seeds of <i>Brassica campestris</i> . The whole amount is boiled thoroughly, slightly cooled and applied to places where there is rheumatic pain. This is done 2-3 times daily till cure of the pain.

Table 1: Continue

41	<i>Abroma augusta</i> L.f.	Sterculiaceae	Ulot kombol	Stem	Spermatorrhoea. One inch size of stems of <i>Abroma augusta</i> are cut into 2-3 pieces and soaked in water. The water is then taken with molasses prepared from stem juice of <i>Saccharum officinarum</i> thrice daily for 7 days.
42	<i>Nyctanthes arbor tristis</i> L.	Verbenaceae	Sheuli, Shefali	Young leaf	Fever. 8-10 leaves are macerated to obtain juice to which water is added to make ½ cup. A red hot iron rod is immersed in the juice and the juice taken orally while still in a warm condition. The procedure is to be done 2-3 times daily on an empty stomach for 7 days. Side-effects include vomiting tendency.
43	<i>Phyla nodiflora</i> (L.) Greene	Verbenaceae	Koi-a okra	Leaf	Muscular pain. One handful of leaves is thoroughly washed in water and the water discarded. One pinch of table salt is added to the leaves and the leaves are then squeezed on the palm of hand and applied to affected area with pressure. This is done twice daily for 1-2 days.
44	<i>Cayratia trifolia</i> (L.) Domin.	Vitaceae	Choto goala	Young leaf	Excessive bleeding during menstruation. At first a 1.5 inch portion of root of <i>Achyranthes aspera</i> is taken with one leaf of <i>Piper betle</i> and one small fruit (nut) of <i>Areca catechu</i> , chewed and only the resulting juice swallowed on an empty stomach. Next, a handful of young leaves of <i>Cayratia trifolia</i> is fried thoroughly and taken with a handful of boiled rice, which is still warm. The process is repeated 2-3 times daily for 2-3 days.
45	<i>Cissus pedata</i> Lam.	Vitaceae	Goala	Leaf	Snake bite. Several leaves are mixed with a little salt and water from hookah (water pipe for smoking), macerated and applied to the bitten area.
46	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Ada	Rhizome	Bone fracture. One handful of leaves of <i>Morus indica</i> is mixed with 50g rhizomes of <i>Zingiber officinale</i> , 20 fruits of <i>Piper nigrum</i> , and 25-30 drops of oil prepared from seeds of <i>Brassica campestris</i> and macerated thoroughly. The mixture is then applied to fractured area as a thick paste and bandaged with a piece of cloth. A fresh mixture is applied and bandaged for 7 days. Rheumatism. 75g rhizomes of ginger (<i>Zingiber officinale</i>), 100g of garlic (<i>Allium sativum</i>) and 85g of onions (<i>Allium cepa</i>) are macerated together to extract the juice. To the juice is added 86g atosh (root of an unidentified plant) and an equal amount of darmuz (arsenic), mudra shankar (unidentified chemical, possibly a chromium salt) and camphor. One powdered seed of <i>Datura stramonium</i> is added to the mixture along with 400 g of oil from seeds of <i>Brassica campestris</i> . The whole amount is boiled thoroughly, slightly cooled and applied to places where there is rheumatic pain. This is done 2-3 times daily till cure of the pain. Bone fracture. First bark from roots of mature trees of <i>Bombax ceiba</i> is macerated with raw cow milk and rhizomes of <i>Zingiber officinale</i> to form a paste. The paste is applied thickly over the fractured area and bandaged with leaves of <i>Anthocephalus chinensis</i> . If there is too much fracture, the area should be straightened with a splint. After 24 hours, the bandage is removed. After the bandage has been taken off, the fractured area is rubbed with old ghee (clarified butter from cow milk). The area is then bandaged with a piece of cloth till mended.

References

- Hossan, M.S., A. Hanif, B. Agarwala, M.S. Sarwar, M. Karim, M.T. Rahman, R. Jahan and M. Rahmatullah, 2010. Traditional use of medicinal plants in Bangladesh to treat urinary tract infections and sexually transmitted diseases. *Ethnobotany Research and Applications*, 8: 61-74.
- Rahmatullah, M., D. Ferdausi, M.A.H. Mollik, R. Jahan, M.H. Chowdhury and W.M. Haque, 2010. A Survey of Medicinal Plants used by Kavirajes of Chalna area, Khulna District, Bangladesh. *African Journal of Traditional, Complementary and Alternative Medicines*, 7(2): 91-97.

- Nawaz, A.H.M.M., M. Hossain, M. Karim, M. Khan, R. Jahan and M. Rahmatullah, 2009. An ethnobotanical survey of Rajshahi district in Rajshahi division, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3(2): 143-150.
- Mia, M.M.K., M.F. Kadir, M.S. Hossain and M. Rahmatullah, 2009. Medicinal plants of the Garo tribe inhabiting the Madhupur forest region of Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3: 253-261.
- Hanif, A., Md. Shahadat Hossain, Md. Manzurul Kadir Mia, Mohammad Jahirul Islam, Rownak Jahan and Mohammed Rahmatullah, 2009. Ethnobotanical survey of the Rakhain tribe inhabiting the Chittagong Hill Tracts region of Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3(2): 172-180.
- Nawaz, A.H.M.M., M. Hossain, M. Karim, M. Khan, R. Jahan and M. Rahmatullah, 2009. An ethnobotanical survey of Jessore district in Khulna Division, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3: 195-201.
- Shahidullah, M., M. Al-Mujahidee, S.M.N. Uddin, M.S. Hossain, A. Hanif, S. Bari and M. Rahmatullah, 2009. Medicinal plants of the Santal tribe residing in Rajshahi district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3: 220-226.
- Hossain, Md. Shahadat, Abu Hanif, Mujib Khan, Sazzadul Bari, Rownak Jahan and Mohammed Rahmatullah, 2009. Ethnobotanical survey of the Tripura tribe of Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3(2): 253-261.
- Rahmatullah, M., D. Ferdausi, M.A.H. Mollik, M.N.K. Azam, M.T. Rahman and R. Jahan, 2009. Ethnomedicinal Survey of Bheramara Area in Kushtia District, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3(3): 534-541.
- Rahmatullah, M., A. Noman, M.S. Hossain, M.H. Rashid, T. Rahman, M.H. Chowdhury and R. Jahan, 2009. A survey of medicinal plants in two areas of Dinajpur district, Bangladesh including plants which can be used as functional foods. *American Eurasian Journal of Sustainable Agriculture*, 3(4): 862-876.
- Rahmatullah, M., A.K. Das, M.A.H. Mollik, R. Jahan, M. Khan, T. Rahman and M.H. Chowdhury, 2009. An Ethnomedicinal Survey of Dhamrai Sub-district in Dhaka District, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3(4): 881-888.
- Rahmatullah, M., M.A.H. Mollik, A.T.M.A. Azam, M.R. Islam, M.A.M. Chowdhury, R. Jahan, M.H. Chowdhury and T. Rahman, 2009. Ethnobotanical Survey of the Santal tribe residing in Thakurgaon District, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3(4): 889-898.
- Rahmatullah, M., I.J. Mukti, A.K.M.F. Haque, M.A.H. Mollik, K. Parvin, R. Jahan, M.H. Chowdhury and T. Rahman, 2009. An Ethnobotanical Survey and Pharmacological Evaluation of Medicinal Plants used by the Garo Tribal Community living in Netrakona district, Bangladesh. *Advances in Natural and Applied Sciences*, 3(3): 402-418.
- Rahmatullah, M., M.S. Hossain, A. Hanif, P. Roy, R. Jahan, M. Khan, M.H. Chowdhury and T. Rahman, 2009. Ethnomedicinal Applications of Plants by the Traditional Healers of the Marma Tribe of Naikhongchhari, Bandarban District, Bangladesh. *Advances in Natural and Applied Sciences*, 3(3): 392-401.
- Cotton, C.M., 1996. *Ethnobotany: Principle and Application*, John Wiley and Sons, New York, pp: 399.
- Gilani, A.H. and A.U. Rahman, 2005. Trends in ethnopharmacology. *Journal of Ethnopharmacology*, 100: 43-49.
- Martin, G.J., 1995. *Ethnobotany: a 'People and Plants' Conservation Manual*, Chapman and Hall, London, pp: 268.
- Maundu, P., 1995. Methodology for collecting and sharing indigenous knowledge: a case study. *Indigenous Knowledge and Development Monitor*, 3: 3-5.