

## ORIGINAL ARTICLE

### Variations in selection of medicinal plants by tribal healers of the Soren clan of the Santal tribe: a study of the Santals in Rajshahi district, Bangladesh

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#### ABSTRACT

The Santals are one of the largest indigenous communities or tribes in Bangladesh. They mainly inhabit the north-western districts of the country including Rajshahi district, where Santals can be found scattered in a number of villages of the district. The tribe has a number of clans. We have previously conducted an ethnomedicinal survey of the Soren clan of the Santals residing in Kannapara and Mondumala villages of Rajshahi district. During a further survey, another group of the Soren clan was found to inhabit Nobogram village of the same district. A preliminary survey revealed that the tribal healer of this clan used medicinal plants, which were quite different from the plants observed to be used by the healers in our previous survey. As such, a full survey was carried out. The tribal healer of Nobogram village was observed to use a total of 25 medicinal plants for treatment of diverse ailments versus the 52 medicinal plants used by the healers as observed in our previous survey in Kannapara and Mondumala villages. Of the various plants used by the healers in our two surveys, only six plants were found to be in common. Even those six plants were used for treatment of different ailments by the healers of the two areas. The results clearly indicate major differences in the selection of medicinal plants by healers within the Soren clan of the Santals residing in different villages, and which differences may indicate outside influences, possibly arising from contact with mainstream folk medicinal practitioners. The formulations used by the healer of the present survey were also much simpler than the formulations of medicinal plants obtained in our previous survey. The number of ailments treated by the healer of the present survey was lesser, and included abscess, pain, itches, irregular menstruation, lack of milk in nursing mother, being touched by 'evil' wind, snake bite, dysentery, diarrhea, rheumatism, flatulency, eczema, goiter, cuts and wounds, infections of skin, and diabetes. Two formulations were also used for purification of blood. A total of 19 medicinal formulations were obtained in the present survey versus the 34 formulations obtained in the previous survey. The results highlight the importance of conducting surveys among as many traditional healers of different tribal habitats as possible to get a comprehensive account of the medicinal plants and formulations of any particular tribe.

**Key words:** Medicinal plants, Santal, Soren, Rajshahi, Bangladesh

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#### Introduction

Traditional medicinal systems play an important role in the health-care system of many countries with Bangladesh being no exception to this practice. Several forms of traditional medicinal systems exist in Bangladesh like homeopathy, Ayurveda, and the Unani systems. In addition, there is the folk medicinal system, practitioners of which can be found amongst the mainstream population as well as the various indigenous communities or tribes of the country. The formulations of folk medicinal (also tribal medicinal) practitioners mainly contains medicinal plants, but may occasionally include animal parts and minerals as well.

We had been conducting ethnomedicinal surveys among folk medicinal and tribal medicinal practitioners for a number of years (Nawaz *et al.*, 2009; Rahmatullah *et al.*, 2009a-c; Chowdhury *et al.*, 2010; Hasan *et al.*, 2010; Hossan *et al.*, 2010; Mollik *et al.*, 2010a,b; Rahmatullah *et al.*, 2010a-g; Akber *et al.*, 2011; Biswas *et al.*, 2011a-c; Haque *et al.*, 2011; Islam *et al.*, 2011a; Jahan *et al.*, 2011; Rahmatullah *et al.*, 2011a,b; Sarker *et al.*, 2011; Shaheen *et al.*, 2011; Das *et al.*, 2012; Rahmatullah *et al.*, 2012a-d). Such documentation of traditional

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medicinal practices is important for many important modern drugs have resulted from close observation of indigenous medicinal practices (Balick and Cox, 1996; Cotton, 1996; Gilani and Rahman, 2005). During our various ethnomedicinal surveys, we have observed that the medicinal plants and formulations used even by mainstream folk medicinal practitioners (Kavirajes) can vary widely even among adjoining villages of any given area. This finding highlights the importance of conducting as many surveys as possible and involving the maximum number of practitioners or healers as possible to get a comprehensive idea of the medicinal plants and medicinal formulations used within the country by the healers. The whole data base can then be utilized for further research with plants and formulations towards discovery of newer and better drugs.

The Santals are one of the largest indigenous communities of Bangladesh. They have twelve clans, which again are distributed throughout a number of villages, particularly in the north-western districts of the country. Rajshahi forms one such district, where members of various clans can be found in multiple villages. This distribution can be based on intra-clan as well as inter-clan members. For instance, the Soren clan of the Santals (which is a large clan) can be found spread out in a number of villages of Rajshahi as well as other districts. We have previously conducted an ethnomedicinal survey among the tribal healers of the Soren clan residing in Kannapara and Mondumala villages of Rajshahi district (Rahmatullah *et al.*, 2012b). During the course of further surveys in Rajshahi district, we found another community of this clan residing in Nobogram village of the same district. A preliminary survey revealed that the medicinal plants and formulations used by the tribal healer of Nobogram village differed considerably from the medicinal plants and formulations used by the healers of Kannapara and Mondumala villages. Towards getting a comprehensive picture of the traditional medicinal plants and formulations of the Soren clan of the Santals, it was the objective of the present study to conduct an ethnomedicinal survey of the healer of the Soren clan of Nobogram village of Rajshahi district.

## Materials and Methods

The Soren clan of Nobogram village in Rajshahi district had one tribal medicinal practitioner or healer named Selina Putul Soren. Only 23 households of the clan resided in this Soren community. The tribal healer had converted to Christianity. The Soren community was surrounded by villagers who spoke Bengali and belonged to the mainstream population of Bangladesh. The Sorens also spoke fluent Bengali; however, some of the medicinal plant names as obtained from the Soren healer differed from Bengali names of the plants.

Informed consent was first obtained from the healer. The healer was explained the purpose of our visit and particular consent obtained to disseminate the information both nationally and internationally. Actual interviews were conducted in the Bengali language with the help of a semi-structured questionnaire. Medicinal plants were collected and detailed information obtained following the guided field-walk method of Martin (1995) and Maundu (1995). In this method, the healer took the interviewers on guided field-walk through areas where the healer collected the plants, pointed out the plants, and described their uses. Notes were taken on the spot. Plant specimens were photographed and also collected on the spot. The dried plant specimens were later brought back to Dhaka for identification by Mr. Manjur-Ul-Kadir Mia, ex-Curator and Principal Scientific Officer of the Bangladesh National Herbarium.

## Results and Discussion

A total of 19 formulations were obtained from the Soren healer, which are shown in Table 1. The formulations contained a total of 25 plant species of which whole plants or plant parts were used. The formulations for the most part were simple, mainly consisting of a particular whole plant or plant part, which was administered either orally or topically. For instance, leaves of *Sida cordata* were macerated and applied as a poultice for treatment of abscess (Serial Number 1). For treatment of itches, oil obtained from seeds of *Pongamia pinnata* was topically applied to itches (Serial Number 5). Two plant parts were used in some treatments; for instance, in one of the treatments for pain, the leaves of *Calotropis procera* were used topically in combination with mustard oil obtained from seeds of *Brassica juncea* (Serial Number 3). According to the healer, *Calotropis procera* could be used for treatment of both external as well as internal pain. For external pain (like pain from injury), the afore-mentioned method was followed. For internal pain (like headache), the leaves of the plant were smoked following putting the leaves within hollow stems of the plant. According to the healer, the smoking enabled the analgesic substances of the plant to reach internal organs which are suffering from pain. Like the topical use of mustard oil (which by itself, especially when warm, can serve as an anodyne, emollient, and help disperse any bio-active phytochemicals present in the plant to be dispersed evenly over the skin, and help the absorption of lipophilic substances through the skin), the healer showed a good amount of knowledge through the use of smoking to alleviate internal pain. Any analgesic phytochemical(s) present within the plant can be taken internally through smoking, unless the compound is destroyed by burning. However, the question remains as to why the leaves of the plant were smoked and not just orally administered, which process would still enable the body to access relevant bio-active (i.e. analgesic compounds) to reach the body. A

possible hypothesis is that oral administration of the leaves may result in destruction of the relevant analgesic compound(s) within the stomach before it can reach the target organs of the body. Notably, ethanolic extract of leaves of this plant has been shown to have anti-inflammatory and analgesic activities (Saba *et al.*, 2011).

**Table 1:** Medicinal plants and formulations of the Soren clan healer of the Santal tribe of Nobogram village, Rajshahi district, Bangladesh.

Serial Number	Ailment with symptoms	Formulation and dosage	Local name of plants/ingredients used
1	Abscess.	Leaves of <i>Sida cordata</i> (Burm. f.) (Malvaceae) are macerated and applied as poultice around the abscess.	<i>Sida cordata</i> : Chip chirip
2	Blood purifier.	Bark of <i>Azadirachta indica</i> A. Juss. (Meliaceae) is mixed with bark of <i>Tamarindus indica</i> L. (Fabaceae), bark of <i>Acacia nilotica</i> Delile (Fabaceae), bark of <i>Spondias pinnata</i> (L. f.) Kurz (Anacardiaceae), and whole plants of Agni baegun (unidentified). The barks and whole plant is pressed to obtain juice. Syrup prepared from the juice is taken for 3 months thrice daily. In the morning, the syrup is taken on an empty stomach, and in the afternoon and evening the syrup is taken after meals.	<i>Azadirachta indica</i> : Neem <i>Tamarindus indica</i> : Tetul <i>Acacia nilotica</i> : babla <i>Spondias pinnata</i> : Aamra Unidentified: Agni baegun
3	Pain.	Leaves of <i>Calotropis procera</i> (Aiton) R.Br. ex W.T.Aiton (Asclepiadaceae) are rubbed with mustard oil [oil obtained from seeds of <i>Brassica juncea</i> (L.) Czern. (Cruciferae)]. Leaves are then warmed and applied to painful areas. Alternately, hollow stems of <i>Calotropis procera</i> is taken and cut into sizes of bidis (small cigars) and partly sliced. Leaves of the plant are dried and powdered and the powder is inserted into the hollow of stem slices. Then they are smoked like bidis.	<i>Calotropis procera</i> : Akondo, Akauna <i>Brassica juncea</i> : Shorisha
4	Blood purifier.	Juice obtained from macerated whole plants of <i>Streblus asper</i> Lour. (Moraceae) is orally taken.	<i>Streblus asper</i> : Sohora gach
5	Itches.	Oil obtained from seeds of <i>Pongamia pinnata</i> L. (Fabaceae) is applied to itches. Note that soap cannot be used during the whole time of oil application.	<i>Pongamia pinnata</i> : Kuruch
6	Irregular menstruation.	Roots of <i>Pergularia daemia</i> (Forsk.) (Asclepiadaceae) are macerated with 2-3 seeds of <i>Piper nigrum</i> L. (Piperaceae). Pills made from the macerated mix are taken thrice daily.	<i>Pergularia daemia</i> : Moron phool <i>Piper nigrum</i> : Gol morich
7	To increase lactation in nursing mother.	Top of stem of <i>Euphorbia tirucalli</i> L. (Euphorbiaceae) is broken and partly sliced. Seven boiled <i>Puntius ticto</i> (Cyprinidae, English: Ticto barb) fish are inserted into the sliced stem and taken orally. This is continued for 7 days.	<i>Euphorbia tirucalli</i> : Dal bahar <i>Puntius ticto</i> : Punt mach
8	Being touched by 'evil wind'.	Three flowers of <i>Hibiscus rosa sinensis</i> L. (Malvaceae) along with bark of <i>Bombax ceiba</i> L. (Bombacaceae) and 3 leaves of <i>Piper betle</i> L. (Piperaceae) are macerated together and taken orally in the morning on an empty stomach. This is continued for 3 days.	<i>Hibiscus rosa sinensis</i> : Joba phool <i>Bombax ceiba</i> : Shimul <i>Piper betle</i> : Paan
9	Knee and waist pain.	Bark of <i>Terminalia arjuna</i> (Roxb.) Wight & Arn. (Combretaceae) is macerated with cow milk and cumin [seeds of <i>Cuminum cyminum</i> L. (Apiaceae)] and applied as poultice to painful areas for 7 days.	<i>Terminalia arjuna</i> : Arjun <i>Cuminum cyminum</i> : Jeera
10	Toothache, snake bite, dysentery.	Teeth are brushed with stems of <i>Jatropha curcas</i> L. (Euphorbiaceae) to get relief from toothache. Macerated young leaves are mixed with two pinches of salt and applied to snake-bitten areas. Sap of the plant is mixed with sugar and taken for dysentery.	<i>Jatropha curcas</i> : Jamal kotha
11	Rheumatism, insect repellent.	Roots of <i>Mimosa pudica</i> L. (Fabaceae) are crushed and mixed with soft pulp of fruits of <i>Aegle marmelos</i> L. (Corr.) (Rutaceae). The mixture is warmed and applied to painful areas. Plant is grown in front of house to repel insects.	<i>Mimosa pudica</i> : Lojjaboti <i>Aegle marmelos</i> : Bael
12	Flatulency.	Leaves of <i>Aegle marmelos</i> L. (Corr.) (Rutaceae) are macerated with salt and put inside hollowed ears of corn [ <i>Zea mays</i> L. (Poaceae)]. The ears of corn are then roasted over a fire, following which they are soaked in cold water. The water is strained and taken orally.	<i>Aegle marmelos</i> : Bael <i>Zea mays</i> : Bhutta
13	Eczema.	Leaves of <i>Senna sophera</i> (L.) Roxb. (Fabaceae) are macerated with a pinch of table salt and applied to affected areas.	<i>Senna sophera</i> : Jhunki
14	Pain.	Roots of <i>Pedilanthus tithymaloides</i> L. (Euphorbiaceae) are macerated and then mixed with mustard oil [oil obtained from seeds of <i>Brassica juncea</i> (L.) Czern. (Cruciferae)]. The mixture is warmed and applied topically to painful areas.	<i>Pedilanthus tithymaloides</i> : Bera khet <i>Brassica juncea</i> : Shorisha
15	Diarrhea.	Bark of <i>Ricinus communis</i> L. (Euphorbiaceae) is macerated and taken. Alternately, the bark is tied with a	<i>Ricinus communis</i> : Venna

		thread and worn around the neck.	
16	Any type of pain.	21 leaves of <i>Codiaeum variegatum</i> (L.) Blume (Euphorbiaceae) are crushed, mixed with a little salt, and then warmed and applied topically to painful areas.	<i>Codiaeum variegatum</i> : Pata bahar
17	Ghag disease (goiter).	Fruits of <i>Tamarindus indica</i> L. (Fabaceae) are soaked in water followed by drinking the water. Note that aged fruits are better.	<i>Tamarindus indica</i> : Tetul
18	Cuts and wounds, infections of skin.	Leaves of Laalpata (unidentified) are macerated and applied to affected areas.	<i>Unidentified</i> : Laalpata
19	Diabetes.	Leaves and stems of <i>Andrographis paniculata</i> (Burm. f.) (Acanthaceae) are soaked in water followed by drinking the water.	<i>Andrographis paniculata</i> : Moha tita

**Table 2:** Comparison of medicinal plants and diseases treated by the tribal medicinal practitioners of the Soren clan of the Santal tribe (of Nobogram village) and the Soren clan (of Kannapara and Mondumala villages) of Rajshahi district, Bangladesh.

Nobogram village			Kannapara and Mondumala villages		
Plant name	Family	Diseases treated	Plant name	Family	Diseases treated
<i>Andrographis paniculata</i>	Acanthaceae	Diabetes.			
			<i>Justicia adhatoda</i>	Acanthaceae	Asthma.
			<i>Acorus calamus</i>	Acoraceae	Typhoid, snake bite.
			<i>Achyranthes aspera</i>	Amaranthaceae	To increase libido, burning sensations during urination, hydrocele.
			<i>Amaranthus spinosus</i>	Amaranthaceae	To increase libido.
			<i>Curculigo orchioides</i>	Amaryllidaceae	Deafness.
			<i>Mangifera indica</i>	Anacardiaceae	Lesions on the tongue.
<i>Spondias pinnata</i>	Anacardiaceae	Blood purifier.			
<i>Cuminum cyminum</i>	Apiaceae	Knee and waist pain.			
			<i>Holarrhena pubescens</i>	Apocynaceae	Helminthiasis, piles (hemorrhoids), dysentery.
			<i>Nerium indicum</i>	Apocynaceae	Skin diseases, fever, abortifacient.
<i>Calotropis procera</i>	Asclepiadaceae	Pain.			
<i>Pergularia daemia</i>	Asclepiadaceae	Irregular menstruation.			
			<i>Centratherum anthelminticum</i>	Asteraceae	Helminthiasis, deafness due to old age.
			<i>Eclipta alba</i>	Asteraceae	Sexual weakness in males.
<i>Bombax ceiba</i>	Bombacaceae	Being touched by 'evil' wind.	<i>Bombax ceiba</i>	Bombacaceae	Sexual weakness in males.
			<i>Heliotropium indicum</i>	Boraginaceae	To increase libido.
<i>Terminalia arjuna</i>	Combretaceae	Knee and waist pain.			
			<i>Benincasa hispida</i>	Cucurbitaceae	Helminthiasis, colic pain, flatulence, enlarged heart, lesions on the tongue..
			<i>Coccinia grandis</i>	Cucurbitaceae	Abscess, diabetes, lack of appetite, vomiting tendency due to poisoning.
<i>Brassica juncea</i>	Cruciferae	Pain.			
			<i>Cyperus scariosus</i>	Cyperaceae	Dysentery, appetite stimulant, bleeding from gums, insect bite.
<i>Codiaeum variegatum</i>	Euphorbiaceae	Any type of pain.			
			<i>Croton tiglium</i>	Euphorbiaceae	Sexual weakness in males.
			<i>Euphorbia</i>	Euphorbiaceae	Passing of semen

<i>Euphorbia tirucalli</i>	Euphorbiaceae	To increase lactation in nursing mother.	<i>nerifolia</i>		with urine.
<i>Jatropha curcas</i>	Euphorbiaceae	Toothache, snake bite, dysentery.			
<i>Pedilanthus tithymaloides</i>	Euphorbiaceae	Pain.			
<i>Ricinus communis</i>	Euphorbiaceae	Diarrhea.	<i>Ricinus communis</i>	Euphorbiaceae	Lesions on the tongue.
<i>Acacia nilotica</i>	Fabaceae	Blood purifier.			
			<i>Adenanthera pavonina</i>	Fabaceae	Headache, conjunctivitis, bleeding from gums.
<i>Senna sophora (Cassia sophora)</i>	Fabaceae	Eczema.	<i>Cassia sophora</i>	Fabaceae	Constipation, coughs.
<i>Mimosa pudica</i>	Fabaceae	Rheumatism, insect repellent.			
<i>Pongamia pinnata</i>	Fabaceae	Itches.			
			<i>Sesbania grandiflora</i>	Fabaceae	Epilepsy, gonorrhoea, dry coughs.
<i>Tamarindus indica</i>	Fabaceae	Blood purifier, goiter.			
			<i>Clerodendrum indicum</i>	Lamiaceae	Asthma, respiratory difficulties, chest pain due to cold, helminthiasis.
			<i>Hyptis suaveolens</i>	Lamiaceae	Underweight.
			<i>Ocimum tenuiflorum</i>	Lamiaceae	Respiratory difficulties.
			<i>Cinnamomum tamala</i>	Lauraceae	Influenza.
			<i>Cinnamomum verum</i>	Lauraceae	Influenza.
			<i>Asparagus racemosus</i>	Liliaceae	Filariasis, sexual dysfunction in men, night blindness.
<i>Hibiscus rosa sinensis</i>	Malvaceae	Being touched by 'evil' wind.			
<i>Sida cordata</i>	Malvaceae	Abscess.			
<i>Azadirachta indica</i>	Meliaceae	Blood purifier.			
			<i>Stephania japonica</i>	Menispermaceae	Low density of semen, abscess, infections of skin.
			<i>Tinospora cordifolia</i>	Menispermaceae	Passing of semen with urine, leucorrhoea, helminthiasis, gonorrhoea, respiratory difficulties.
<i>Streblus asper</i>	Moraceae	Blood purifier.	<i>Streblus asper</i>	Moraceae	Abscess, dysentery.
			<i>Vanda tessellata</i>	Orchidaceae	Paralysis, rheumatic pain.
			<i>Oxalis corniculata</i>	Oxalidaceae	Piles, abscess/infections.
			<i>Passiflora incarnata</i>	Passifloraceae	Paralysis of any organ of the body.
<i>Piper betle</i>	Piperaceae	Being touched by 'evil' wind.	<i>Piper betle</i>	Piperaceae	Passing of semen with urine.
			<i>Piper longum</i>	Piperaceae	Influenza.
<i>Piper nigrum</i>	Piperaceae	Irregular menstruation.	<i>Piper nigrum</i>	Piperaceae	Influenza.
			<i>Plantago ovata</i>	Plantaginaceae	Sexual weakness in males.
			<i>Plumbago indica</i>	Plumbaginaceae	Abortifacient, leprosy, paralysis.
			<i>Oldenlandia corymbosa</i>	Rubiaceae	Burning sensations in hands or legs, dysentery.
			<i>Paederia foetida</i>	Rubiaceae	Piles, constriction of

					nerves leading to distortion in hands or feet, stoppage of urination, paralysis.
<i>Aegle marmelos</i>	Rutaceae	Rheumatism, flatulency.			
			<i>Glycosmis pentaphylla</i>	Rutaceae	Infertility in women, tooth diseases, infections.
			<i>Datura metel</i>	Solanaceae	Breast abscess, pain, asthma, helminthiasis, dog bite.
			<i>Solanum barbisetum</i>	Solanaceae	Chicken pox, typhoid, influenza.
			<i>Withania somnifera</i>	Solanaceae	Tuberculosis, underweight in children.
			<i>Abroma augusta</i>	Sterculiaceae	Sexual weakness in males, pain.
			<i>Carum copticum</i>	Umbelliferae	Dysentery, appetite stimulant, bleeding from gums, insect bite.
			<i>Centella asiatica</i>	Umbelliferae	Sexual weakness in males.
			<i>Nyctanthes arbor-tristis</i>	Verbenaceae	Pitto jor (symptoms: burning sensations in the body, redness in eyes, long-term fever with vomiting), rheumatic pain, waist pain.
			<i>Premna integrifolia</i>	Verbenaceae	Snake bite.
			<i>Vitis trifolia</i>	Vitaceae	Abscess, stoppage of urination, insect bite, snake bite, excessive bleeding during menstruation.
			<i>Curcuma longa</i>	Zingiberaceae	Passing of semen with urine, leucorrhoea, piles.
			<i>Elettaria cardamomum</i>	Zingiberaceae	Lesions on the tongue.
			<i>Zingiber officinale</i>	Zingiberaceae	Paralysis, rheumatic pain, breast abscess, hydrocele.

A complex formulation was used by the healer for purification of blood (Serial Number 2). In this formulation, whole plant or plant parts from five different plant species were used. That the blood can become impure (particularly through toxins produced from accumulated undigested food in the intestines, which then enters the blood), and that such impure blood can be a cause of diseases, is a widespread notion held in Ayurveda, Unani and folk medicinal systems of Bangladesh. The Soren healer's putting importance on the purification of blood was evidenced by having two formulations in place for such purification (Serial Numbers 2 and 4).

In one of the formulations, the healer used a Euphorbiaceae family plant along with a fish species, *Puntius ticto*, for increasing milk in nursing mothers (Serial Number 7). The fish species is a common small fish abundantly found in even small water bodies throughout Bangladesh. It is considered a tasty fish, but cheap, because it is a bony fish. The fish is occasionally advised by Ayurvedic practitioners to be fried in clarified butter (ghee) and taken with rice as treatment for impotency in males. It is possible that the fish served a vital role in this case to provide essential protein nutrition to the lactating mother. Since girls are given in marriage at an early age in Bangladesh (among both mainstream population as well as tribes), and since girls are the family members suffering most from malnutrition in Bangladesh, addition of extra protein can serve to increase lactation in the nursing mother. Whether the Euphorbiaceae plant used, namely *Euphorbia tirucalli*, serves to increase lactation in nursing mothers, remain to be scientifically determined.

One of the formulations (Serial Number 8) was for treatment of being touched by 'evil wind', the nature of which disease could not be determined. It is commonly believed by the rural population as well as tribal populations that a person can be affected by 'evil eye' or 'evil wind'. While such evil eye or evil wind actually

exists or not is a controversial issue; certainly these cannot be substantiated through scientific methods. But it is believed that evil wind occurs from evil spirits who roam areas (particularly desolate areas) and most often at night, and can affect a person who by chance has been passing through the area.

The use of *Terminalia arjuna* bark to treat knee and waist pain (Serial Number 9) has been validated by modern scientific research where the bark of this plant has been shown to possess centrally acting analgesic potential (Islam *et al.*, 2011b). *Jatropha curcas* (used by the healer to relieve toothache, Serial Number 10), has also been reported to possess analgesic properties (Omeh and Ezeja, 2010). While there are no scientific reports on the validity of use of this plant for treatment of dysentery (Serial Number 10), it is to be noted that the Bhil and Bhilala tribes of Jhabua district in Madhya Pradesh, India also use the plant for treatment of dysentery (Wagh *et al.*, 2011). The anti-inflammatory activity of *Mimosa pudica* (used by the healer for treatment of rheumatism, Serial Number 11) has also been shown, thus justifying its traditional use (Goli *et al.*, 2011). The efficacy of *Aegle marmelos* in the relief of flatulency has been reviewed (Dhankhar *et al.*, 2011); the healer used the plant for the same purpose (Serial Number 12). Finally, the efficacy of *Andrographis paniculata* (used by the healer for treatment of diabetes, Serial Number 19) has also been shown through its antidiabetic and antihyperlipidemic effect in high fructose-fat-fed rats (Nugroho *et al.*, 2012).

The most striking finding of the present study was the enormous differences between the selection of medicinal plants as observed in the present study and a previous study on another community of the Soren clan of the Santal tribe in different villages, but within the same district of Rajshahi (Rahmatullah *et al.*, 2012b). The results are shown in Table 2. While the present healer used only 19 formulations involving 25 plant species, healers in the other study used a total of 52 plant species in 34 different formulations. The major differences between the present and previous survey on the same tribal clan but residing in different areas (albeit the same district) can be summarized as follows: (I) in the present study the healer used a much lower number of plants and formulations, (II) in the present study the healer used much less complex formulations, (III) in the present study, lesser number of ailments were treated, and (IV) even when the healers of the two studies used the same plant species, the plants were used for treatment of different ailments. Thus of the six common plant species observed between the two studies, the present healer used *Bombax ceiba* for treatment of 'being touched by evil wind' whereas in the previous study, the healers used this plant species for treatment of sexual weakness in males. *Ricinus communis* was observed in the present study to be used for treatment of diarrhea, but in the previous study for treatment of lesions on the tongue. *Cassia (Senna) sophera* was seen in the present study used for treatment of eczema versus treatment of constipation and coughs in the previous report. *Streblus asper* was used by the present healer as a blood purifier but used by healers in the previous study for treatment of abscess and dysentery. *Piper betle* was used in the present study along with *Bombax ceiba* for treatment of being touched with 'evil wind', but used for treatment of passing of semen with urine in the previous report. *Piper nigrum* was used for treatment of irregular menstruation by the present healer, but used for the treatment of influenza by healers in the earlier report.

Where common ailments were seen to be treated in both the present and previous reports, there still showed enormous differences in the plant species used. Snake bite was treated by the previous healers with *Acorus calamus* or *Premna integrifolia* or *Vitis trifolia* but by the present healer with *Jatropha curcas*. Diabetes was treated by the present healer with *Andrographis paniculata*, but by the previous healers with *Coccinia grandis*. Dysentery was treated by the previous healers with *Oldenlandia corymbosa* but by the present healers with *Jatropha curcas*. Whether these differences reflect any interactions with other traditional medicinal practitioners remain to be determined. However, the results highlight the importance of conducting surveys among as many traditional healers of different tribal habitats of any given tribe as much as possible to get a comprehensive account of the medicinal plants and formulations of any particular tribe.

## References

- Akber, M., S. Seraj, F. Islam, D. Ferdousi, R. Ahmed, D. Nasrin, N. Nahar, S. Ahsan, F. Jamal and M. Rahmatullah, 2011. A survey of medicinal plants used by the traditional medicinal practitioners of Khulna City, Bangladesh. American Eurasian Journal of Sustainable Agriculture, 5: 177-195.
- Balick, J.M., and P.A. Cox, 1996. Plants, People and Culture: the Science of Ethnobotany, Scientific American Library, New York, pp: 228.
- Biswas, K.R., T. Ishika, M. Rahman, A. Swarna, T. Khan, M.N. Monalisa and M. Rahmatullah, 2011a. Antidiabetic plants and formulations used by folk medicinal practitioners of two villages in Narail and Chuadanga districts, Bangladesh. American Eurasian Journal of Sustainable Agriculture, 5: 158-167.
- Biswas, A., W.M. Haq, M. Akber, D. Ferdousi, S. Seraj, F.I. Jahan, A.R. Chowdhury and M. Rahmatullah, 2011b. A survey of medicinal plants used by folk medicinal practitioners of Paschim Shawra and Palordi villages of Gaurnadi Upazila in Barisal district, Bangladesh. American Eurasian Journal of Sustainable Agriculture, 5: 15-22.

- Biswas, K.R., T. Khan, M.N. Monalisa, A. Swarna, T. Ishika, M. Rahman and M. Rahmatullah, 2011c. Medicinal plants used by folk medicinal practitioners of four adjoining villages of Narail and Jessore districts, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 5: 23-33.
- Chowdhury, A.R., F.I. Jahan, S. Seraj, Z. Khatun, F. Jamal, S. Ahsan, R. Jahan, I. Ahmad, M.H. Chowdhury and M. Rahmatullah, 2010. A survey of medicinal plants used by Kavirajes of Barisal town in Barisal district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 4: 237-246.
- Cotton, C.M., 1996. *Ethnobotany: Principle and Application*, John Wiley and Sons, New York, pp: 399.
- Das, P.R., M.T. Islam, A.S.M.S.B. Mahmud, M.H. Kabir, M.E. Hasan, Z. Khatun, M.M. Rahman, M. Nurunnabi, Z. Khatun, Y.-K. Lee, R. Jahan and M. Rahmatullah, 2012. An ethnomedicinal survey conducted among the folk medicinal practitioners of three villages in Kurigram district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 6: 85-96.
- Dhankhar, S., S. Ruhil, M. Balhara, S. Dhankhar and A.K. Chhillar, 2011. *Aegle marmelos* (Linn.) Correa: a potential source of phytomedicine. *Journal of Medicinal Plants Research*, 5: 1497-1507.
- Gilani, A.H., and A.U. Rahman, 2005. Trends in ethnopharmacology. *Journal of Ethnopharmacology*, 100: 43-49.
- Goli, V., K.V. Bhaskar, S.P. Macharla, J. Bhaskar, P.S. Devi and T. Ramchander, 2011. Effects of anti-inflammatory activity of *Mimosa pudica*. *Asian Journal of Pharmaceutical Research*, 1: 69-71.
- Haque, M.A., M.K. Shaha, S.U. Ahmed, R. Akter, H. Rahman, S. Chakravotry, A.H.M.N. Imran, M.T. Islam, R.C. Das and M. Rahmatullah, 2011. Use of inorganic substances in folk medicinal formulations: a case study of a folk medicinal practitioner in Tangail district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 5: 415-423.
- Hasan, M.M., M.E.A. Annay, M. Sintaha, H.N. Khaleque, F.A. Noor, A. Nahar, S. Seraj, R. Jahan, M.H. Chowdhury and M. Rahmatullah, 2010. A survey of medicinal plant usage by folk medicinal practitioners in seven villages of Ishwardi Upazilla, Pabna district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 4: 326-333.
- 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.
- Islam, F., F.I. Jahan, S. Seraj, I. Malek, A.F.M.N. Sadat, M.S.A. Bhuiyan, A. Swarna, S. Sanam and M. Rahmatullah, 2011a. Variations in diseases and medicinal plant selection among folk medicinal practitioners: a case study in Jessore district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 5: 282-291.
- Islam, K.U.S., Z. Afsana, M.A. Morshed, M. Azim Uddin, J.M.A. Hannan, T.A. Khan and M.G. Sarwar, 2011b. Evaluation of antinociceptive effect of *Terminalia arjuna* bark ethanol extract. *International Journal of Biomolecules and Biomedicine*, 1: 7-16.
- Jahan, F.I., M.R.U. Hasan, R. Jahan, S. Seraj, A.R. Chowdhury, M.T. Islam, Z. Khatun and M. Rahmatullah, 2011. A Comparison of Medicinal Plant Usage by Folk Medicinal Practitioners of two Adjoining Villages in Lalmonirhat district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 5: 46-66.
- 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.
- Mollik, M.A.H., M.S. Hossan, A.K. Paul, M.T. Rahman, R. Jahan and M. Rahmatullah, 2010a. A comparative analysis of medicinal plants used by folk medicinal healers in three districts of Bangladesh and inquiry as to mode of selection of medicinal plants. *Ethnobotany Research and Applications*, 8: 195-218.
- Mollik, M.A.H., A.I. Hassan, T.K. Paul, M. Sintaha, H.N. Khaleque, F.A. Noor, A. Nahar, S. Seraj, R. Jahan, M.H. Chowdhury and M. Rahmatullah, 2010b. A survey of medicinal plant usage by folk medicinal practitioners in two villages by the Rupsha River in Bagerhat district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 4: 349-356.
- 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: 143-150.
- Nugroho, A.E., M. Andrie, N.K. warditiani, E. Siswanto, S. Pramono, and E. Lukitaningsih, 2012. Antidiabetic and antihyperlipidemic effect of *Andrographis paniculata* (Burm. f.) Nees and andrographolide in high-fructose-fat-fed rats. *Indian Journal of Pharmacology*, 44: 377-381.
- Omeh, Y.S., and M.I. Ezeja, 2010. Analgesic activity of the methanolic leaf extract of *Jatropha curcas* (Linn). *African Journal of Biomedical Research*, 13: 149-152.
- Rahmatullah, M., D. Ferdousi, M.A.H. Mollik, M.N.K. Azam, M.T. Rahman, and R. Jahan, 2009a. Ethnomedicinal Survey of Bheramara Area in Kushtia District, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3: 534-541.

- Rahmatullah, M., A. Noman, M.S. Hossan, M.H. Rashid, T. Rahman, M.H. Chowdhury and R. Jahan, 2009b. 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: 862-876.
- Rahmatullah, M., A.K. Das, M.A.H. Mollik, R. Jahan, M. Khan, T. Rahman and M.H. Chowdhury, 2009c. An Ethnomedicinal Survey of Dhamrai Sub-district in Dhaka District, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3: 881-888.
- Rahmatullah, M., D. Ferdausi, M.A.H. Mollik, R. Jahan, M.H. Chowdhury and W.M. Haque, 2010a. A Survey of Medicinal Plants used by Kavirajes of Chalna area, Khulna District, Bangladesh. *African Journal of Traditional, Complementary and Alternative Medicines*, 7: 91-97.
- Rahmatullah, M., M.A. Khatun, N. Morshed, P.K. Neogi, S.U.A. Khan, M.S. Hossan, M.J. Mahal and R. Jahan, 2010b. A randomized survey of medicinal plants used by folk medicinal healers of Sylhet Division, Bangladesh. *Advances in Natural and Applied Sciences*, 4: 52-62.
- Rahmatullah, M., A.A.B.T. Kabir, M.M. Rahman, M.S. Hossan, Z. Khatun, M.A. Khatun and R. Jahan, 2010c. Ethnomedicinal practices among a minority group of Christians residing in Mirzapur village of Dinajpur District, Bangladesh. *Advances in Natural and Applied Sciences*, 4: 45-51.
- Rahmatullah, M., M.A. Momen, M.M. Rahman, D. Nasrin, M.S. Hossain, Z. Khatun, F.I. Jahan, M.A. Khatun, and R. Jahan, 2010d. A randomized survey of medicinal plants used by folk medicinal practitioners in Daudkandi sub-district of Comilla district, Bangladesh. *Advances in Natural and Applied Sciences*, 4: 99-104.
- Rahmatullah, M., M.A.H. Mollik, M.N. Ahmed, M.Z.A. Bhuiyan, M.M. Hossain, M.N.K. Azam, S. Seraj, M.H. Chowdhury, F. Jamal, S. Ahsan and R. Jahan, 2010e. A survey of medicinal plants used by folk medicinal practitioners in two villages of Tangail district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 4: 357-362.
- Rahmatullah, M., M.A.H. Mollik, M.K. Islam, M.R. Islam, F.I. Jahan, Z. Khatun, S. Seraj, M.H. Chowdhury, F. Islam, Z.U.M. Miajee, and R. Jahan, 2010f. A survey of medicinal and functional food plants used by the folk medicinal practitioners of three villages in Sreepur Upazilla, Magura district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 4: 363-373.
- Rahmatullah, M., R. Jahan, M.A. Khatun, F.I. Jahan, A.K. Azad, A.B.M. Bashar, Z.U.M. Miajee, S. Ahsan, N. Nahar, I. Ahmad and M.H. Chowdhury, 2010g. A pharmacological evaluation of medicinal plants used by folk medicinal practitioners of Station Purbo Para Village of Jamalpur Sadar Upazila in Jamalpur district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 4: 170-195.
- Rahmatullah, M., T. Ishika, M. Rahman, A. Swarna, T. Khan, M.N. Monalisa, S. Seraj, S.M. Mou, M.J. Mahal and K.R. Biswas, 2011a. Plants prescribed for both preventive and therapeutic purposes by the traditional healers of the Bede community residing by the Turag River, Dhaka district. *American Eurasian Journal of Sustainable Agriculture*, 5: 325-331.
- Rahmatullah, M., M.N.K. Azam, M.M. Rahman, S. Seraj, M.J. Mahal, S.M. Mou, D. Nasrin, Z. Khatun, F. Islam and M.H. Chowdhury, 2011b. A survey of medicinal plants used by Garo and non-Garo traditional medicinal practitioners in two villages of Tangail district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 5: 350-357.
- Rahmatullah, M., and K.R. Biswas, 2012a. Traditional medicinal practices of a Sardar healer of the Sardar (Dhangor) community of Bangladesh. *Journal of Alternative and Complementary Medicine*, 18: 10-19.
- Rahmatullah, M., A. Hasan, W. Parvin, M. Moniruzzaman, A. Khatun, Z. Khatun, F.I. Jahan and R. Jahan, 2012b. Medicinal plants and formulations used by the Soren clan of the Santal tribe in Rajshahi district, Bangladesh for treatment of various ailments. *African Journal of Traditional, Complementary and Alternative Medicines*, 9: 342-349.
- Rahmatullah, M., Z. Khatun, A. Hasan, W. Parvin, M. Moniruzzaman, A. Khatun, M.J. Mahal, M.S.A. Bhuiyan, S.M. Mou and R. Jahan, 2012c. Survey and scientific evaluation of medicinal plants used by the Pahan and Teli tribal communities of Natore district, Bangladesh. *African Journal of Traditional, Complementary and Alternative Medicines*, 9: 366-373.
- Rahmatullah, M., M.N.K. Azam, Z. Khatun, S. Seraj, F. Islam, M.A. Rahman, S. Jahan, M.S. Aziz and R. Jahan, 2012d. Medicinal plants used for treatment of diabetes by the Marakh sect of the Garo tribe living in Mymensingh district, Bangladesh. *African Journal of Traditional, Complementary and Alternative Medicines*, 9: 380-385.
- Saba, A.B., P.C. Oguntoke and O.A. Oridupa, 2011. Anti-inflammatory and analgesic activities of ethanolic leaf extract of *Calotropis procera*. *African Journal of Biomedical Research*, 14: 203-208.
- Sarker, S., S. Seraj, M.M. Sattar, W.M. Haq, M.H. Chowdhury, I. Ahmad, R. Jahan, F. Jamal and M. Rahmatullah, 2011. Medicinal plants used by folk medicinal practitioners of six villages in Thakurgaon district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 5: 332-343.

- Shaheen, Md.E.K., Md.A. Syef, S.S. Saha, Md.S. Islam, Md.D.A. Hossain, Md.A.I. Sujan and M. Rahmatullah, 2011. Medicinal plants used by the folk and tribal medicinal practitioners in two villages of Khakiachora and Khasia Palli in Sylhet district, Bangladesh. *Advances in Applied and Natural Sciences*, 5: 9-19.
- Wagh, V.V., A.K. Jain, and C. Kadel, 2011. Ethnomedicinal plants used for curing dysentery and diarrhea by tribals of Jhabua district (Madhya Pradesh). *Indian Journal of Natural Products and Resources*, 2: 256-260.