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Phytotherapeutic practices of a female folk medicinal practitioner in Cumilla district, Bangladesh

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Abstract
Folk medicinal practitioners (FMPs) form a major group of traditional medicinal practitioners in Bangladesh using phytotherapy as their major mode of treatment. The diverse nature of their plant selection, if properly documented, can form a basis for further research and conservation of medicinal plants. Female FMPs are comparatively a rarity; the objective of the present survey was to document the phytotherapeutic practices of a female FMP in Gopalnagar village of Cumilla district, Bangladesh. The FMP was found to use 21 different plant species in her monoherbal and polyherbal formulations, which formulations were used to treat a diverse variety of diseases including gastrointestinal tract disorders, paralysis, diabetes, eczema, pneumonia, infertility, and menstrual pain. A number of the formulations of the FMP appear to be novel and previously not documented in other ethnomedicinal surveys. Taken together, the plant species used by the FMP can prove valuable for further scientific studies leading to new drug discovery as well as spurring conservation efforts.

Keywords: Folk medicine, phytotherapy, Cumilla, Bangladesh, medicinal plants

1. Introduction
Medicinal treatment methods are now generally divided into two categories, namely modern or allopathic medicine based on the paradigm of 'one drug one therapy', the rest being classified as traditional medicine, irrespective of the mode of treatment but which treatments adopt a holistic approach. Among the various modes of traditional medicine in Bangladesh, the most frequently encountered is what can be termed as folk medicine. Folk medicinal practitioners (FMPs, tribal medicinal practitioners also fall under this category) can be found in all parts of Bangladesh; they do not require any training and are not subjected to any regulations for their practice; and they mostly treat with plant formulations (phytotherapy) with an occasional animal part or mineral thrown in. On paper, it would seem that lack of proper training makes a FMP useless, but in reality we have found in our surveys that FMPs do possess quite extensive knowledge of the medicinal properties of the plant(s) that they use in their formulations [1-10]. What is also most interesting (as observed in our surveys) is that FMPs can differ widely in their selection of plants for the treatment of the same disease even when they are residing and practicing within the same or adjoining locality.

Both aspects of the treatment mode of a given FMP (medicinal plant knowledge and selection diversity of plants) suggest that to get a total overview of the medicinal plants of Bangladesh, it is important to document the phytotherapeutic practices of as many FMPs (including tribal practitioners) as possible throughout the country. Many important drugs have been discovered by closely watching and documenting traditional medicinal practices [11]. Moreover, documentation of medicinal plants used traditionally for hundreds and possibly thousands of years can spur scientific research, aid conservation efforts, and also result in documentation of plants with a wide range of therapeutic action resulting in readily available and affordable sources of new and better medicines. Among FMPs in Bangladesh, female FMPs are a comparative rarity. The objective of this study was to document the phytotherapeutic practices of a female FMP practicing in Gopalnagar village of Cumilla district, Bangladesh. The district is located southeast of Dhaka, Bangladesh's capital. Gopalnagar village is located in Debidwar Upazila (sub-district) of Cumilla district (Fig 1).

Methodology

The present survey was conducted in Gopalnagar village of Cumilla district with a total village population of around 5,500 persons. Gopalnagar village is adjoined by several other villages, namely, Rasulpur, Nabipur, Bhuiyanbari, and Nabinagar. The main occupation of the villagers is agriculture, though in recent years there has been a marked drain of people to other countries, being employed as labourers in various categories. The female FMP, Suriya Khatun, age 55 years was the only practicing FMP in the village. The survey was conducted intermittently in 2018 with 5 visits made to the village at different time periods of the year to enable collection of various plant parts (flowers, fruits, leaves) or the plant itself for proper identification. Informed consent was first obtained from the FMP as to publication of information provided by her including her name, age and phytotherapeutic information. The consent was facilitated by the FMP and a number of the village residents being known to one of the authors (NAS).

Interviews were conducted with the help of a semi-structured questionnaire and the guided field-walk method previously described by Martin [12] and Maundu [13]. In this method, the FMP took the interviewers (authors) on guided field walks during the day through areas from she collected her plants. Plants were shown by the FMP, their uses recorded in field notebooks, followed by photographing the plant from different angles. Local names of the plants were obtained from the FMP and further verified from the knowledgeable villagers. Plant parts were also collected, dried and pressed and brought to Dhaka for identification by a competent botanist at the University of Development Alternative. All information obtained was re-verified in evening sessions conducted with the FMP.Plant specimens were deposited with the Medicinal Plant Collection Wing of the University of Development Alternative.

Results

The FMP used a total of 21 plants distributed into 18 families in her various formulations. Some of the formulations were monoherbal, others were polyherbal. There were a total number of thirteen formulations, which were used for treatment of gastrointestinal tract disorders, paralysis, diabetes, eczema, pneumonia, infertility, and menstrual pain**.** Dysentery, paralysis, eczema and pneumonia were treated with two different formulations each. The results are shown in Table 1. Interestingly, both paralysis treatment formulations were polyherbal and contained seeds of *Myristica fragrans* as a common ingredient. Dysentery was also treated with two polyherbal formulations; however, two different plant parts of *Capsicum frutescens*, namely leaves and fruits were used separately in the two formulations.

One plant used for treatment of eczema was *Exacum tetragonum*. To our knowledge, this is the first reported use of the plant in Bangladesh to treat a skin disorder. The tribals of Purulia district, West Bengal, India, use the plant as a febrifuge [14]. The leaves of the plant are used to treat otitis media (inflammatory diseases of the middle ear) in Khao Kho district, Phetchabun Province, Thailand [15]. It is to be noted that although two formulations were used by the FMP for treatment of eczema, a skin disorder, none of the formulations were used topically. Both formulations were to be taken orally. Atopic dermatitis (eczema) has no known allopathic cure, so the formulations of the FMP may prove beneficial to patients with eczema, if scientifically validated.

Discussion

Gastritis is inflammation of the lining of the stomach. The FMP used roots of *Amaranthus spinosus* to treat this condition. The anti-inflammatory property of methanol extract of leaves has been reported [16]. It remains to be seen whether roots can give the same effect. In Assam, India, plant juice is given during gastric trouble; in Ayurveda, the plant is known as 'tanduliyaka' and pacifies pitta and kaphadoshas (inclusive of digestive disorders) [17]. *In vivo* anthelmintic activity has been observed with fruit peeling juice of *Ananascomosus* in semi-scavenging Philippine native chicken naturally co-infected with *Ascaridia galli* and *Heterakis gallinarum* [18]. The FMP used a section of the plant (pith) for anthelmintic purpose. Such use is not uncommon in Bangladesh and has been reported before for FMPs practicing in Narayanganj district of the country [19]. The use of *A. comosus* pith along with *Areca catechu* root has also been reported for helminthiasis treatment in Khulna district, Bangladesh [20]. Arecoline, a component of *A. catechu* nut [21], reportedly can purge intestinal helminthes [22].

Centella asiatica is known to inhibit enteric pathogens [23], and so can be beneficial during dysentery. Fruits of *Capsicum frutescens* can also inhibit several enteric pathogens [24], thus contributing to the anti-dysentery effect. Decoction of leaves of *Crataeva nurvala* can relieve flatulence and abdominal pain; the plant has anti-diarrheal properties [25]. As such, the combination of the three plant parts by the FMP to treat dysentery appears to be valid from the scientific point of view.

Myristica fragrans seeds were used in two formulations by the FMP, both for treatment of paralysis. The essential oil of the plant is traditionally used for sprains, rheumatism and paralysis [26]. *Terminalia chebula* is used in Unani medicine for paralysis (*istirkha* in Unani) treatment; in Unani the plant is known as Halelah Siyah [27]. In one of his formulation, the FMP used *Heliotropium indicum* along with *M. fragrans* and *T. chebula*. To our knowledge, this is the first reported use of *H. indicum* in paralysis. A review on the ethnomedicinal uses of the plant throughout the world does not mention paralysis at all [28]. In another of his formulations for paralysis, the FMP used seeds of *Vigna mungo* with *H. indicum*. In traditional medicines of Pakistan, seeds of *V. mungo* reportedly are used for partial and facial paralysis [29]. The formulation needs to be studied scientifically for validation; if found to be correct, it may prove beneficial for patients suffering partial or facial paralysis arising from stroke.

Coccinia cordifolia is a useful plant for diabetic patients; in clinical trials with patients having mild diabetes, the alcoholic extract of the plant was observed to have hypoglycemic activity [30]. Solvent extracts of *Leucas aspera* were found to be active against a number of microorganisms including *Klebsiella pneumoniae* [31], the causative organism of pneumonia. The massaging of leaves of *Stephania japonica* on the scalp to treat pneumonia (as done by the FMP) appears to be an unusual mode of treatment and needs to be scientifically examined for its efficacy. The use of *Ocimum sanctum* leaves to cure infertility by the FMP appears to run in direct contradiction to available scientific evidence. In male rats, leaves were found to cause anti-fertility with one of the leaf components ursolic acid being the causative agent [32].

The ashes of leaves of *Musa sapientum* and *Musa paradisiaca* are traditionally used to treat eczema [33]; oral partaking of a fruit of *Capsicum frutescens* within the fruit of *Musa sapientum* to treat eczema as done by the FMP, seems to be a novel method for treatment of this skin disorder. The FMP's

formulation of treating dysentery with root of *Musa seminifera* in combination with fruits of *Tamarindus indica* and *C. frutescens* appears to be novel and a previously unreported way of treating dysentery. However, the fruits of *T. indica* (without the seeds) are considered in some African and the Indian sub-continent countries to be good for diarrhea, dysentery, and abdominal pain [34]. The fruits of *Piper nigrum* and their major constituent reportedly have analgesic and anti-inflammatory activities [35]; antinociceptive activity has been reported for methanolic extract of leaves of *Polygonum hydropiper* [36]. Thus, in combination, the two plant parts may prove useful in alleviating menstrual pain, suggesting that the FMP was knowledgeable about the pain-alleviating properties of the plant parts.

To conclude, most of the plants used by the FMP have pharmacological properties in tune with their uses by the FMP. Thus, these plants make a strong case for conservation and further scientific research towards discovery of more efficacious drugs.

Table 1. Medicinal plants and formulations of the FMP from Gopalganj district.

Scientific Name	Family Name	Local Name	Parts used	Ailments treated
Amaranthus spinosus L.	Amaranthaceae	Katakhudura	Root	Gastritis. Root juice is taken orally with sugar or molasses.
Centella asiatica (L.) Urb.	Apiaceae	Thankuni	Leaf	See *Crataeva nurvala*.
Areca catechu L.	Arecaceae	Supari	Root	See *Ananas comosus*.
Heliotropium indicum L.	Boraginaceae	Hatichutra	Stem	See *Terminalia chebula*.
Brassica juncea L.	Brassicaceae	Sharisha	Seed	See *Ocimum sanctum* and *Vigna mungo*. See *Myristica fragrans* and *Vigna mungo*.
Ananas comosus (L.) Merr.	Bromeliaceae	Anarosh	Fruit	Anthelmintic. Juice is made from the part of *A. comosus* (where the leaves first begin and which is white in color, also known as pith) and root of *Areca catechu* and the combination taken orally till cure.
Crataeva nurvala Buch. –Ham.	Capparaceae	Bonnopata	Leaf	Dysentery. Leaves of *Crataeva nurvala* and *Centella asiatica* and fruits of *Capsicum frutescens* are macerated to obtain juice, which is taken orally till cure.
Terminalia chebula Retz.	Combretaceae	Horital	Leaf	Paralysis. *Terminalia chebula* (100g), *Myristica fragrans* (8 seeds), and *Heliotropium indicum* stem (100g) are cut into small pieces and dried. Then these are taken orally with honey twice daily after taking meal in the night and morning. During the time this medication is taken, the patient is advised not to eat any beef, duck, eggs, *Puntius* species of fish, candies, and dried fish.
Coccinia cordifolia L.	Cucurbitaceae	KuchilaPata	Leaf	Diabetes. Leaves are cooked or crushed to obtain juice. The leaves or the juice are taken orally thrice daily.
Tamarindus indica L.	Fabaceae	Tetul	Fruit	See *Musa seminifera*.
Vigna mungo L.	Fabaceae	Mashkolai	Seed	Paralysis. One-eighth kg of seeds of *Vigna mungo* is fried in mustard oil. Then a large seed of *Myristica fragrans* is also fried in mustard oil. The two are mixed together and massaged on the affected areas followed by applying hot compresses of *Vigna mungo* seeds.
Exacum tetragonum Roxb.	Gentianaceae	Keochra	Root	Eczema. The bottom part of *E. tetragonum* is cooked with honey and rice to make a local dish called 'sinni' and taken orally for 15 consecutive days.
Leucas aspera (Willd.) Link	Lamiaceae	Dolgorosh	Flower, Leaf	Pneumonia. The leaves are fried in oil and taken orally by adults. The flower of this plant is made into a paste and administered orally to infants with breast milk.
Ocimum sanctum L.	Lamiaceae	Tulshi	Leaf	Infertility. Leaves are fried with chicken eggs in mustard oil (oil obtained from the seeds of *Brassica juncea*). Then it is orally taken after bath for three consecutive days.
Stephania japonica (Thunb.) Miers	Menispermaceae	Muichani pata	Leaf	Pneumonia. Leaves are mixed with mustard oil and massaged onthe scalp.
Musa sapientum L.	Musaceae	Kola	Fruit	Eczema. A green *Capsicum frutescens* fruitis put within the fruit of *Musa sapientum* and taken orally for 15 consecutive days.
Musa seminifera Lour	Musaceae	Bichi kola	Root	Dysentery. After a *Musa seminifera* plant is cut at the soil surface the inner core part of the plant that is just below the soil is taken and mixed with *Tamarindus indica* fruits and small amount of *Capsicum frutescens* fruits. The whole mixture is then made into a paste and taken orally in the morning after breakfast for three consecutive days.
*Myristica fragrans*Houtt.	Myristicaceae	Jaifol	Fruit	See *Terminalia chebula* and *Vigna mungo*. See *Brassica juncea* and *Vigna mungo*.
Piper nigrum L.	Piperaceae	Golmorich	Seed	Reducing menstrual pain. Twenty-one seeds of *Piper nigrum* is macerated with twenty-one leaves of *Polygonum hydropiper* and then dried in the sun. Seven pills are prepared from the dried mixture. Two pills are taken orally one day before menstruation starts. The rest 5 pills are taken orally for the next 5 consecutive days.
Polygonum	Polygonaceae	Bishkatali	Leaf	See *Piper nigrum*.

hydropiper L.				
Capsicum frutescens L.	Solanaceae	Kachamorich	Fruit	See *Tamarindus indica* and *Musa seminifera*. See *Centella asiatica* and *Crataeva nurvala*. See *Musa sapientum*.

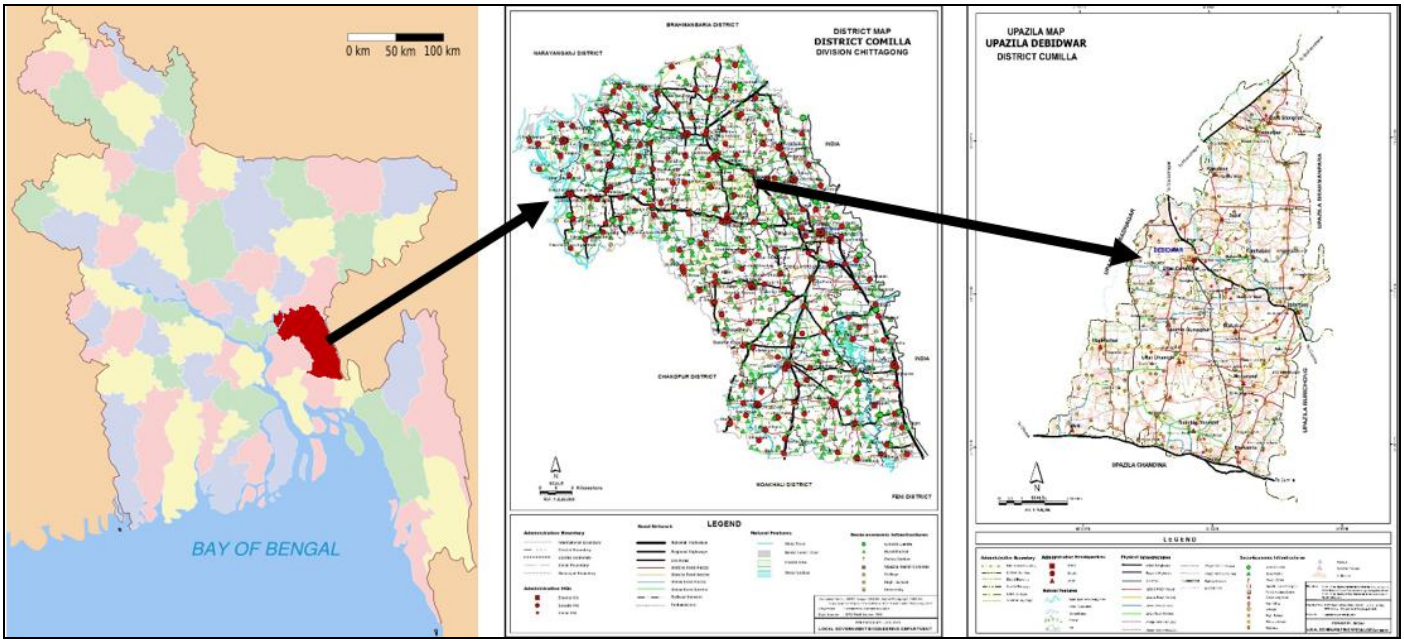

Fig 1: From left to right: Map of Bangladesh showing Cumilla district (in red); map showing the various Upazilas of Cumilla district; and map showing Debidwar Upazila in detail.

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