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Sabnam Roy Suma
Department of Pharmacy, Faculty of Life Sciences, University of Development Alternative, Lalmatia, Dhaka-1207, Bangladesh

Mohammed Rahmatullah
Professor, Department of Biotechnology & Genetic Engineering, Faculty of Life Sciences, University of Development Alternative, Lalmatia, Dhaka-1207, Bangladesh

Corresponding Author:
Mohammed Rahmatullah
Professor, Department of Biotechnology & Genetic Engineering, Faculty of Life Sciences, University of Development Alternative, Lalmatia, Dhaka-1207, Bangladesh

An ethnomedicinal survey among the Manipuri tribe in Maulvibazar district, Bangladesh

Sabnam Roy Suma and Mohammed Rahmatullah

Abstract
Background: The medicinal practices of indigenous people, have in the past and more so in the present, forming valuable sources of information towards discovery of new medicines. The use of plants as medicines has been going on possibly since the first evolution of human beings. Ancient human beings kept alive the medicinal tradition through memorization and oral transmission from generation to generation, much like what various indigenous people/tribes practice till the present day. Bangladesh has a number of tribes, and the objective of this survey was to conduct an ethnobotanical survey among the Manipuri tribal people in Maulvibazar district in the northeast part of Bangladesh. The survey was limited in extent because not only the tribal population has dwindled, but also most of the tribal medicinal knowledge has been forgotten because of the influence of allopathic drugs.
Methods and findings: Interviews were conducted of four tribal medicinal practitioners (TMPs). After building up rapport with the tribal community through a number of field trips, information about their use of medicinal plants was obtained with their full consent. Pictures were taken of the plants used by the TMPs and plant specimens identified by a trained botanist. Information on only seventeen plants could be obtained.
Conclusions: The present survey gives valuable insights into the tribal medicinal customs of the Manipuri people. The survey also indicates that tribal medicinal practices may be on the verge of disappearing because of dwindling forests along with sharply declining population of the indigenous people.

Keywords: Maulvibazar, Bangladesh, Manipuri tribe, medicinal plants, tribal medicine

Introduction
Human beings are dependent on plants in a number of ways. Plants can serve as food, used to manufacture clothing and habitat, used to build transport systems like boats and carts, and also serve as medicines. The human-plant-medicine axis possibly goes a long way back starting from the arrival of *Homo sapiens*, or possibly even earlier [1]. In this human-plant-medicine axis, plants are used as medicines for treatment of diseases; the selection of plants possibly depends on their availability within the local area, therapeutic effectiveness and/or a multitude of socio-cultural factors [2]. This makes an interesting point as to what actually led ancient medicinal practitioners in a locality to select a particular plant for treatment of a given disease, for the same plant may not be available throughout the world. The question is important, for plants still form a major source for modern drugs [3], and a proper understanding of how medicinal plants were selected by ancient practitioners can be of enormous assistance in the modern quest for new drugs. The list of current drugs derived from plants is enormous; just to name a few, atropine, berberine, codeine, colchicine, digitoxin, artemisinin, taxol, reserpine, vincristine and vinblastine were all originally derived from plants [4].
Human beings are facing an enormous need for new drugs at present for many older drugs are no longer effective due to rise of drug-resistant vectors and emergence of new diseases (both infectious and non-infectious) against which drugs are yet to be discovered. Plants form secondary metabolites and each plant species form a diverse array of secondary metabolites with pharmacological activities that can prove useful for disease treatment. These secondary metabolites can be directly used as drugs or a particular secondary metabolite's structure can be a scaffold for designing new drugs [5]. However, to save expenses and time from costly and lengthy searches of checking every secondary metabolite against a host of diseases, it is far more expeditious to gather knowledge on the medicinal properties of a given plant from traditional medicinal practitioners, for the TMPs may have a long tradition of knowing the medicinal properties of plants in their locality.

On the other hand, modern human beings are facing a dichotomy; as the need for indigenous medicinal plant knowledge increases, both TMPs and wild plants are becoming scarce under the onslaught of destroying forests [https://www.ucsusa.org/sites/default/files/2019-09/Deforestation-Today-It-s-Just-Business.pdf, accessed February 10, 2023], which is causing uprooting of tribes. It has been said that human beings are currently driving to extinction plant species at rates 100 to 1000 times faster than normal [6].

Bangladesh is a rich source of medicinal plants, tribal and folk medicinal practitioners, and traditional medicinal practitioners belonging to established schools of medicine like Ayurveda, Unani, and homeopathy. Ayurveda, Unani, and homeopathy schools of medicine have their own institutions imparting their particular concept of medical knowledge including treatment to their graduates, who are Government-recognized. On the other end of the spectrum are the tribal and folk medicinal practitioners, who do not need to graduate from any medical institution or need Government-issued certificates/permits for practicing their profession. Anybody with the slightest amount of knowledge or even without any experience/knowledge can practice folk medicine and even obtain fame with time, and trials and errors. On the other hand, folk medicinal practice has its own number of quacks and charlatans [7], who are out to make a quick buck before departing for greener pastures after swindling as many of the gullible patients as possible.

Taken together, the traditional established medicinal practitioners (Ayurveda, Unani, and homeopathy) and the folk and tribal medicinal practitioners (FMPs and TMPs) form an impressive group of practitioners in alternative medicine, who can form the nucleus of the first step towards novel drug discoveries from medicinal plants. Unfortunately, the numbers of FMPs and TMPs are possibly dwindling in Bangladesh because of the influence of allopathic medicines and loss of forest lands and habitats of indigenous people, along with loss or scarcity of medicinal plant species. Where previously practically every village of the 86,000 villages of Bangladesh would have one or more FMPs, now-a-days in our experience, it is difficult to locate one FMP in even four to five villages. The same applies to TMPs because their loss of habitat is forcing the indigenous people/tribes to assimilate with the mainstream population and adopting the latter's customs. Before indigenous medicinal knowledge gets totally lost, we had been trying to gather as much information as possible from TMPs and FMPs, and other traditional medicinal practitioners as rapidly as possible, of which some have been published [8-40]. The objective of the present study was to collect medicinal plant information from tribal practitioners of the Manipuri tribe residing in Kamalgang Upazila (sub-district) of Maulvibazar district in Sylhet Division of Bangladesh.

Methods

Information was collected from four TMPs of the Manipuri tribe, who resided near the Lawachara National Park located in Kamalganj Upazila. Prior informed consent was obtained from the four TMPs including publishing both their names and information provided nationally and internationally. Three of the TMPS, Rathindra Roy, Jugol Kishore Singha, and Nanda Kishore Mukherjee were males, while Arpita Sharma was a female. The ethnobotanical survey methods as described by Martin [41] and Maundu [42] were followed.

Results and Discussion

Kamalganj Upazila is located in Maulvibazar district, Bangladesh. It has an area of 485.26 square kilometers with a location of 24°08' to 24°27' North latitude and 91°46' to 91°50' East longitude. Maps of Kamalganj Upazila, Maulvibazar district and Bangladesh are shown in Figures 1-3, respectively. A number of tribes inhabit Maulvibazar district. These tribes are Khasia, Manipuri, and Tripura. According to information given in Banglapedia [https://en.banglapedia.org/index.php/Maulvibazar_District, accessed February 10, 2023], agriculture forms the main source of income followed by agricultural laborer, the latter means working on other people's land. Tea gardens (Figure 4) form the main sources of agricultural income and hire the majority of agricultural laborers; Madhabpur Lake (Figure 5) is one of the spots frequented by tourists.

The Manipuri tribe is also known as the Meitei. In Bangladesh, the tribe is now scattered as different communities in Sylhet town and its suburbs, and Kamalganj, Sreemangal, Kulaura and Barlekha thanas (thana means police station; in terms of area, thana means the area controlled by a particular police station) of Maulvibazar district; Chunarughat thana of Habiganj district, and Chhatak thana of Sunamganj district. According to the 1991 Population Census, there are only about 25,000 Manipuris in Bangladesh. Of them about 13,000 are in Maulvibazar, 7,000 in Sylhet and 4,000 in Habiganj districts, all these areas being in the northeastern part of Bangladesh. The tribe is of Mongolian descent and arrived at the then East Bengal during British occupation of India from the Indian kingdom of Manipur. The tribal people work in the tea gardens, but those who have land cultivate rice, sugarcane, tobacco, oranges and pineapples.

The Manipuris do not eat meat but eat fish. They have their houses built by a river's edge for it is their custom to bathe and wash clothes in river water. Marriage can only occur if bride and groom are from different clans. Although the tribe has converted mainly to Hinduism, remnants of their animistic beliefs still remain like making decisions after observing the position of a rooster's feet.

The diseases treated by the Manipuri TMPs included hair loss, burns, jaundice, eczema, night blindness, nocturnal emission, coughs, gastrititis and indigestion, piles, hypertension, and helminthiasis. According to the TMPs, they had forgotten a large number of medicinal plants and their uses for a number of reasons. These reasons included inclination of the young generation towards allopathic medicine, not enough patients, destruction of forest regions where they collected their medicinal plants resulting in non-availability of the plants, and a gradual assimilation with the mainstream Bengali-speaking population resulting in gradual erosion of tribal customs and culture. As mentioned before, the tribe has now practically totally adopted Hinduism as their religion and losing their previous animistic beliefs.

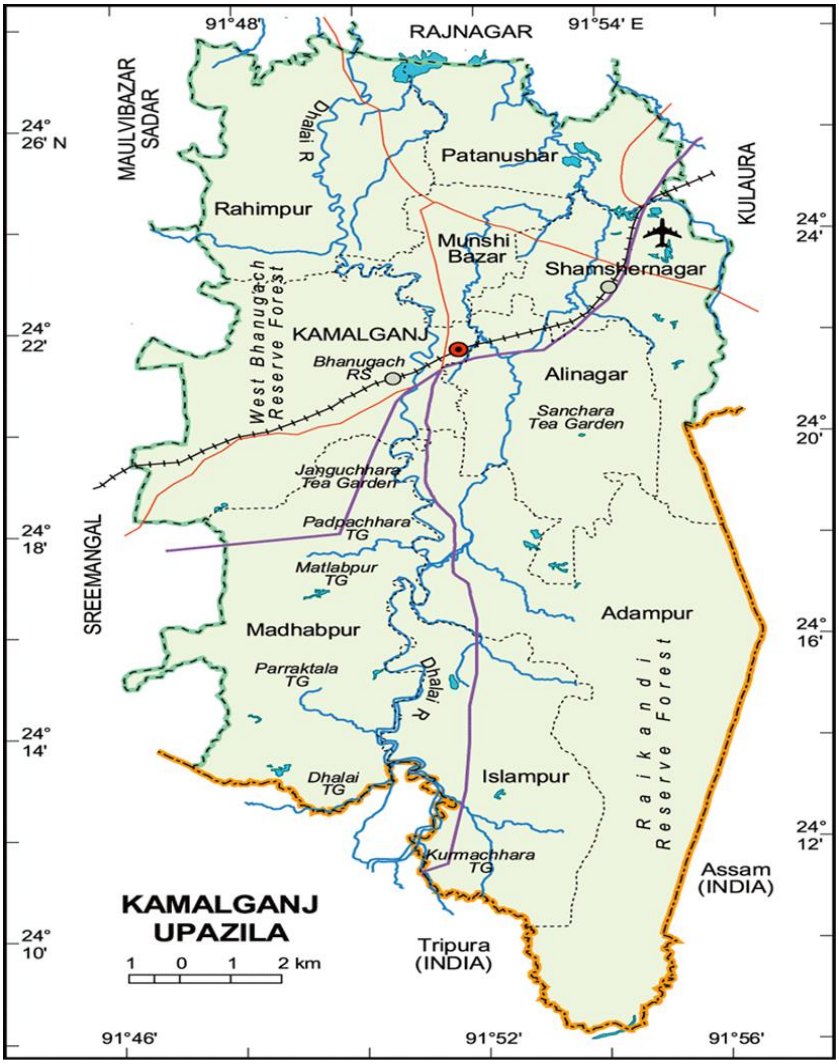

Fig 1: Map of Kamalganj Upazila, Maulvibazar district, Bangladesh

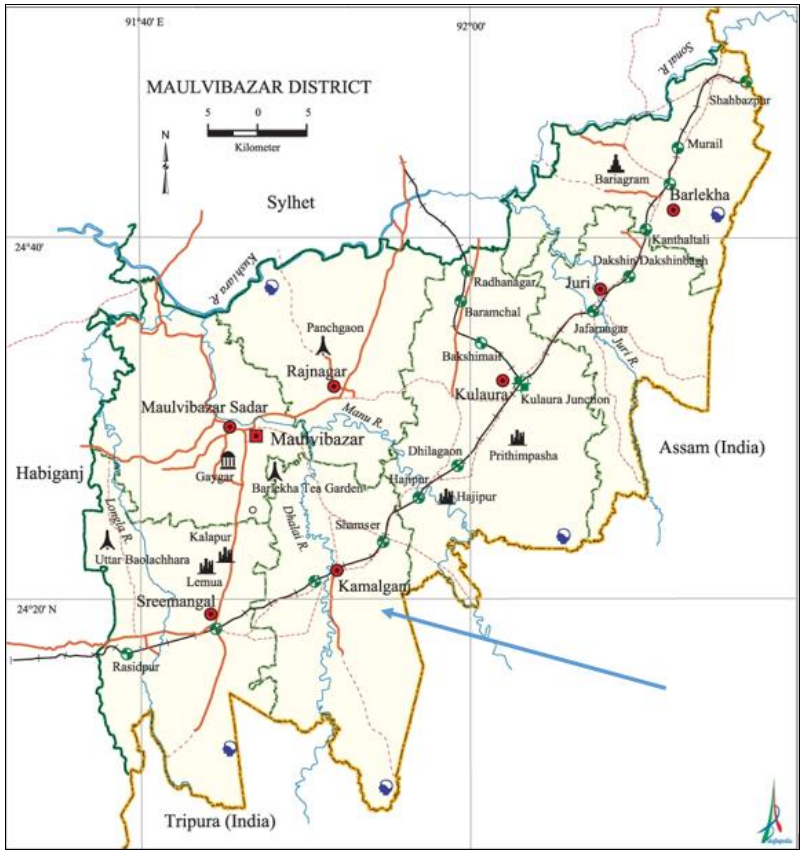

Fig 2: Map of Maulvibazar district. Kamalganj is shown with an arrow

Fig 3: Map of Bangladesh with Maulvibazar district shown with arrow

Fig 4: A tea garden in Maulvibazar district

Fig 5: Madhabpur Lake in Maulvibazar district

A total of seventeen (17) medicinal plant species were used by the four TMPs, as shown in Table 1. These plants formed the basis of eleven (11) formulations used for treatment of various diseases.

Table 1: Medicinal plants and their uses among the Manipuri tribal community of Kamalganj Upazila, Maulvibazar district

Scientific name	Family	Local name	Part(s) used	Ailments and formulations
Nerium indicum L.	Apocynaceae	Rokto korobi	Leaf	Hair loss. Paste of the leaves of *Nerium indicum* is applied on the scalp for 1 to 1.5 hour once a week for two weeks.
Borassus flabellifer L.	Arecaceae	Tal	Fruit	See *Hibiscus rosa-sinensis*.
Phoenix dactilyfera L.	Arecaceae	Khejur	Sap	See *Hibiscus rosa-sinensis*.
Tagetes erecta L.	Asteraceae	Gada	Leaf	See *Cynodon dactylon*.
Mesua ferrea L.	Calophyllaceae	Nageshwar	Leaf, fruit	Burns. Powder of the dried leaves and fruits of *Mesua ferrea* is mixed with small amount of clarified butter (locally called ghee) to make a paste. This paste is applied on the burned area once or twice a day until cure.
Luffa acutangula L.	Cucurbitaceae	Jhinga gach	Seed	Jaundice. Powder of dried seeds of *Luffa acutangula* is mixed with 100 ml of water and 2 tea spoonful of this suspension is taken once daily on an empty stomach for 10 days.
Acalypha	Euphorbiaceae	Shib jota	Flower	Eczema. Juice of the flowers of *Acalypha hispida* is taken once daily on an empty

indica L.				stomach for 15 days.
Ricinus communis L.	Euphorbiaceae	Verenda	Leaf	Night blindness. Leaves of *Ricinus communis* is fried with clarified butter (locally called ghee) and taken 25g once a day until cure.
Hibiscus rosa-sinensis L.	Malvaceae	Joba	Floral stalk	Nocturnal emission. 100g juice obtained by squeezing the flower stalks of *Hibiscus rosa-sinensis*, 50g crystallized sugar obtained from fruit juice of *Borassus flabellifer* (locally called Talmisri), and 25g molasses prepared from sap of *Phoenix dactylifera* are mixed together to make a paste. This paste is put on the leaf of *Musa acuminata* plant and dried under sunlight. Then the dried paste is crushed to make powder. 2 tea spoonfuls of this powder are mixed with 1tea spoonful of water and taken twice daily for a few days.
Tinospora cordifolia (Thunb.) Miers	Menispermaceae	Gulancha	Leaf	Coughs, gastritis and indigestion. For coughs, leaf extract of *Tinospora cordifolia* is mixed with the seed powder of *Piper nigrum* and then 2 tea spoonfuls of this mixture is taken thrice daily for 3 days. For gastritis and indigestion, leaf extract of *Tinospora cordifolia* is mixed with seed powder of *Piper umbellatum* and rock salt (locally called beet lobon). One and half tea spoonful of this mixture is taken twice daily until cure.
Musa acuminata L.	Musaceae	Kola	Leaf	See *Hibiscus rosa-sinensis*.
Piper nigrum L.	Piperaceae	Gol morich	Seed	See *Tinospora cordifolia*.
Piper umbellatum L.	Piperaceae	Not known		See *Tinospora cordifolia*.
Cynodon dactylon (L.) Pers.	Poaceae	Durba ghas	Leaf	Piles. Two tea spoonfuls of a mixture of leaf extract of *Cynodon dactylon* and *Tagetes erecta* is taken once daily on an empty stomach for three weeks.
Saccharum officinarum L.	Poaceae	Akh	Stem juice	See *Curcuma longa*.
Centella asiatica (L.) Urb.	Umbelliferae/Apiaceae	Thankuni (choto)	Leaf	Hypertension. Juice obtained by squeezing the leaves of *Centella asiatica* is mixed with a small amount of table salt (sodium chloride) and ½ cup of this mixture is taken on an empty stomach for 10 days.
Curcuma longa L.	Zingiberaceae	Holud	Rhizome	Anthelmintic. Paste of the rhizome of *Curcuma longa* is mixed with a small amount of molasses prepared from stem juice of *Saccharum officinarum* and water. Then this mixture is taken 1 tea spoonful once daily on an empty stomach in the morning for 3 to 4 days.

Among the diseases treated, the two most important perhaps were hypertension and jaundice. Hypertension was treated with leaf juice of *Centella asiatica*, and to our knowledge is the first reported instance of the plant in Bangladesh for treatment of hypertension. In Bangladesh, two varieties of the plant can be seen – a small leaf and a large leaf variety. However, plant taxonomists classify both varieties as the same species and attribute leaf size difference to growth differences due to regional variations. It has been reported from Indonesia, that plants grown in highland and midland regions have larger leaf size than plants grown in lowland regions [43]. A recent report mentions that ethanolic extract of the plant was observed to prevent the development of hypertension and cardiac damage induced by L-NAME [N (gamma)-nitro-L-arginine methyl ester] in Sprague-Dawley rats, similar to captopril [44]. Ethanol extraction of the plant reportedly yields flavonoids and terpenoids like asiatic acid and asiaticoside [45]. Asiatic acid has been shown to have anti-hypertensive effects in a number of studies [46, 47]. What the scientific data suggests is that not only treatment of hypertension with *Centella asiatica* is scientifically validated, but also illiterate Manipuri TMPs used this treatment long before scientists were aware of this effect, further validating the use of ethnomedicinal surveys for new drug discovery.

Jaundice is regarded as happening if skin or whites of eyes turns yellow. This occurs if there is too much bilirubin in blood and is usually regarded as an indicator of liver disorder, but can happen in gall bladder and pancreatic disorders. Hepatoprotective plants are regarded as possessing phytochemicals with the potential ability for treating jaundice. The TMPs treated jaundice with the seeds of *Luffa acutangula*, which to our knowledge has not been reported previously from Bangladesh. The use of leaves and fruit powder for treatment of jaundice has previously been reported for Maharashtra and tribal areas of Madhya Pradesh in India [48]. The hepatoprotective activity of hydroalcoholic extract of the plant against carbon tetrachloride and rifampicin-induced hepatotoxicity has been demonstrated in rats [49].

Jaundice can happen from varying causes like viral infections (e.g. hepatitis B), excessive alcohol consumption, and autoimmune disorders. The TMPs did not distinguish between disorders as to what specific reason or infection is the cause for jaundice. They simply diagnosed jaundice by the color of skin and/or eyes. Nevertheless, the plant they used for treatment of jaundice have reported hepatoprotective properties. As such, more scientific studies are needed to determine whether seeds and other parts of the plant have any anti-hepatitis viral activity. A ribosome-inactivating peptide, luffangulin, has been reported from seeds [50]. Ribosome-inactivating proteins/peptides can have anti-viral activity [51].

Besides the two examples mentioned above, the knowledge of the TMPs was also evidenced by their use of *Mesua ferrea* leaf and fruit powder paste with clarified butter for treatment of burns. Use of clarified butter can serve a number of purposes. It can act as an emollient, it can keep the skin soft, and it can help lipid-soluble ingredients in the plant powder to be absorbed more readily in the skin by reversibly overcoming the stratum corneum (SC) barrier [52]. Depending on leaf color, *Ricinus communis* leaves can contain variable amounts of anthocyanin [53]. The therapeutic effects of anthocyanin(s) on vision and eye health have been extensively reviewed [54]. Anthocyanins can become unstable in aqueous media leading to their low bioavailability [55]. Frying *Ricinus communis* leaves in clarified butter prior to taking them orally thus can improve bioavailability and can be beneficial for night blindness. The above two applications further suggest

that the TMPs possessed quite in-depth knowledge on the medicinal use of plants/plant parts, which modern science can utilize to produce novel drugs.

It is a dichotomy of the modern world that when scientists are discovering the value of indigenous medicine, indigenous people are fast losing their traditional medicinal knowledge under the onslaught of losing their forest habitat along with medicinal plants, and the lure of quick cure with allopathic medicines. Allopathic medicines are now recognized to develop resistance and cause adverse effects in a short period of time. It is time to recognize the values of traditional medicine and strive intensively for conservation of the indigenous people and their forest habitats.

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