

Medicinal Plants Used in the traditional Treatment of Several Viral Diseases in Bangladesh

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Viral fevers, measles, chicken pox, and rabies are fairly common occurrences throughout Bangladesh. Since the population of the country is predominantly rural without proper access to modern medical facilities, they rely on traditional medical practitioners (Vaidyas) and plant-based formulas to treat such viral diseases. Ethnobotanical surveys were carried out amongst three ethnic groups (Garo, Khasia and Santal) and five districts of Bangladesh to identify medicinal plants used for the treatment of the above diseases. It was observed that six plants *Nyctanthes arbortristis*, *Swertia chirata*, *Vitex negundo*, *Andrographis paniculata*, *Clerodendrum viscosum* and *Tinospora cordifolia* were used for treatment of viral fevers. *Stemona tuberosa* was used in case of measles. *Moringa oleifera* and *Azadirachta indica* were used to treat chicken pox. Three plants, namely *Cyathula prostrata*, *Amaranthus spinosus*, and *Calotropis procera* were used to treat patients with rabies.

Key words: Viral fever, Measles, Chicken pox, Rabies, Medicinal plants, Traditional medical practitioners.

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(Received March 2008)

(Accepted May 2008)

INTRODUCTION

Bangladesh is an underdeveloped country with a predominantly rural-based population, who lack access to modern health care facilities. The rural population along with a substantial number of urban populations also has a long history of using traditional medicine based on medicinal plants (Ashraf *et al*, 1982), and treatment by traditional medicinal practitioners locally known as "Vaidyas". At least three different traditional medicine systems exists in Bangladesh side by side with the allopathic and homeopathic systems, namely the Ayurvedic system (Pal, 1997) practiced by "Kavirajes", the Unani system practiced by "Hekims" and the system practiced by "Vaidyas", who mostly rely on their own knowledge and experience of medicinal plants to formulate and administer medicinal preparations.

Viral diseases like viral fevers, measles, chicken pox, and rabies are fairly common occurrences throughout Bangladesh. To treat these diseases, rural people rely on Vaidyas and claim that

their treatment is effective enough to cure the above diseases. Vaidyas do not have written treatises, closely guard their medicinal formulations and the knowledge is only passed on from generation to generation within the family. Since their treatments are still used by a large number of people, our hypothesis is that they must be effective to at least a certain extent. The objective of the present study was therefore to conduct an ethnobotanical survey amongst the Vaidyas of five different districts of Bangladesh and persuade them to divulge information on medicinal plants used to treat viral diseases, such that appropriate scientific studies can be conducted on the plants. At the same time we conducted ethnobotanical surveys amongst three ethnic groups of Bangladesh, namely the Garos, Khasias and Santals. The Garos and the Khasias inhabit the north-eastern forest regions (Mymensingh and Sylhet districts) of Bangladesh, while the Santals inhabit the northern regions (Dinajpur and Rangpur districts) of Bangladesh and form the largest tribal community of the area. Together, these three ethnic groups comprise a major portion of the

tribal population of Bangladesh and rely more than the general population on their traditional medicinal practitioners (called "Ojhas" by the Santals).

MATERIALS AND METHODS

Interviews and collection of plant materials

Ethnobotanical interviews were conducted amongst both traditional medicinal practitioners and patients using a semi-structured questionnaire. The normal approach was to get acquainted with the herbal doctor and inquire as to name the plants as well as diseases or symptoms treated. Details were noted down as to the season for collecting, plant parts used, mode of preparation of medicine and dosage, and as to any possible side-effects or precautions to be taken. The herbal doctor was also taken on field trips to places where he collects plant material and plants directly identified by him. Plants identified by the herbal doctor were collected and photographs taken. All interviews were conducted in the local language. At the time of collection, standard herbarium sheets were

completed containing the name of the collector, collection number, date, locality and local name. Information obtained from the herbal doctor was later cross-checked with patients. Patients were also asked to rate the efficacy of treatments.

Plant material

Taxonomic samples were initially pressed between absorbent papers and packed in heavy plastic bags. They were subsequently dried and brought to Bangladesh Herbarium for identification and assignment of accession numbers.

RESULTS AND DISCUSSION

It was observed that six plants *Nyctanthes arbor-tristis*, *Swertia chirata*, *Vilx negundo*, *Andrographis paniculata*, *Clerodendrum viscosum* and *Tinospora cordifolia* are used for treatment of viral fevers. *Stemona tuberosa* is used in case of measles. *Moringa oleifera* and *Azadirachta indica* are used to treat chicken pox. Three plants, namely *Cyathula prostrata*, *Amaranthus*

edema during pregnancy.

A summary of the results is presented in Table 1. A total of twelve plants distributed into ten families were identified, which are used by the population surveyed to treat viral diseases like fevers, measles, chicken pox and rabies. Use of plants or plant parts to treat viral diseases has been reported from various parts of the world. Garlic extract has been shown to demonstrate anti-viral activity when tested *in vitro* against human

cytomegalovirus (Guo *et al.*, 1993).

Infectivity of influenza virus A/WSN/33 was significantly reduced when the virus was pre-incubated with lignin prepared from cones of *Pinus parviflora* Sieb. Et Zucco (Sakagami *et al.*, 1992).

6hydroxytremetone, isolated from the aerial part of *Werneria ciliolata* showed significant anti-human immunodeficiency virus-1 (anti-HIV -1) activity (Piacente *et al.*, 1994). Moderate anti-HIV activity has also been seen with water and methanol extracts of

Rosa damascena (Mahmood *et al.*, 1996).

A new protein designated panaxagin, obtained from *Panax ginseng* has been shown to possess anti-fungal, translation-inhibiting and ribonuclease activities in addition to being inhibitory against HIV reverse transcriptase (Ng and Wang, 2001).

Anti-HIV -1 activity has been demonstrated in *in vitro* bioassays by organic soluble extract from the leaves of *Glycyrrhiza lepidota* (Manfredi *et al.*, 2001).

Saikosaponins, the main active constituents of *Bupleurum* spp., have been shown to possess immunomodulatory, hepatoprotective, anti-tumor and anti-viral activities. Amongst the saikosaponins, saikosaponin c specifically demonstrated activity against anti-hepatitis B virus (HBV) (Chiang *et al.*, 2003).

An aqueous total extract preparation from the roots of *Carissa edulis* (Forssk.) Vahl, a

medicinal plant of Kenya exhibited remarkable anti-herpes simplex virus (HSV) activity *in vitro* and *in vivo* for both wild type and resistant strains of HSV (Tolo *et al.*, 2006).

Extract from gardenia showed significant inhibitory activity against influenza viral pneumonia in mice and virus-induced cytopathic effect (Wang *et al.*, 2006).

Amongst medicinal plants in traditional use with possible anti-viral activities as identified in the present study, ethanolic and n-butanol fractions of *Nyctanthes arbor-tristis* as well as two compounds isolated from the plant, namely arbortristoxide A and arbortristoxide C has been reported to protect encephalomyocarditis virus (EMCV)-infected mice. Pronounced *in vitro* virus inhibitory activity was also reported (Gupta *et al.*, 2005).

Andrographolide, neoandrographolide and 14-deoxy11, 12-didehydroandrographolide, ent-labdene diterpenes isolated from *Andrographis paniculata* showed

viricidal activity against HSV -1 (Wiart *et al.*, 2005). Extract of *Moringa oleifera* have been shown to be effective against HSV -1 as well as thymidine kinase-deficient HSV -1 and phosphonoacetate-resistant HSV -1 strains in both *in vitro* and *in vivo* studies (Lipipun *et al.*, 2003).

Chemical compounds from *Azadirachta indica* have been reported as inhibitors of potato virus X (Verma, 1974). Methanolic extract of leaves of *Azadirachta indica* reportedly inhibited plaque formation in 6 antigenic types of Coxsackie virus B and was most effective against Coxsackie virus B-4 (Badam *et al.*, 1999).

Administration of aqueous extract of leaves of the plant resulted in inhibition of Dengue virus type-2 replication in suckling mice (Parida *et al.*, 2002).

Taken together, four plants from the present study have already been reported to contain anti-viral constituents. Studies are ongoing on the other plants for validation of their anti-viral activities and traditional medicinal usage.

Medicinal Plants Used in the traditional Treatment

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Table 1. Medicinal plants used against viral diseases in the traditional medicinal system of five districts and three ethnic groups of Bangladesh.

Plant	Family	Local name	Parts used for diseases/symptoms
<p><i>Nyctanthes arbortristis</i> L.</p> <p>Synonyms: <i>Nyctanthes dentata</i> Blume</p>	Oleaceae	Sheuli	<p>Leaves. Decoction of the leaves is taken for viral fevers.</p> <p>Decoction of leaves also used to treat coughs, colds, diabetes, and hypertension.</p>
<p><i>Swertia chirata</i> (Wall.) C.B. Clarke</p> <p>Synonyms: <i>Gentiana chirata</i> Wall., <i>Gentiana chirayita</i> Roxb. ex Fleming, <i>Swertia chirayita</i> (Roxb. ex Fleming) H. Karst.</p>	Gentianaceae	Chirata	<p>Stems. Decoction of stems is taken for viral fevers.</p> <p>Leaves are used to treat ulcers.</p>
<p><i>Vitex negundo</i> L.</p> <p>Synonyms: <i>Vitex incisa</i> Lam., <i>Vitex incisa</i> Lam. vaL <i>eterophylla</i> Franch.</p>	Verbenaceae	Nishinda, Miunda	<p>Pills made from paste of leaves taken for viral fevers. Leaf paste is also applied to skin tumors.</p> <p>A decoction of leaves boiled in water is applied topically to reduce muscle ache.</p>
<p><i>Andrographis paniculata</i> (Burin, f.) Wall, ex Nees</p> <p>Synonyms: <i>Andrographis subspathulata</i> CB Clarke, <i>Justica paniculata</i> Burm.</p>	Acanthaceae	Kalomegh	<p>Stems. Soaked overnight in water followed by drinking of water the following morning to treat viral fevers.</p> <p>The whole plant is taken for intestinal and hepatic disorders.</p> <p>Leaves are further used as anthelmintic, for treatment of jaundice and juice from leaves is applied topically for skin diseases.</p>
<p><i>Clerodendrum viscosum</i> Vent.</p> <p>Synonyms: <i>Clerodendrum infortunatum</i> Gaertn.</p>	Verbenaceae	Bhant, Bhait	<p>Leaves. Taken for viral fevers. Juice from the whole plant is fed to cattle to treat diarrhea.</p>

Table (1) Cont.

<p><i>Tinospora cordifolia</i> (Willd.) Hook. F. & Thoms Synonyms: <i>Tinospora glabra</i> (Burm f.) Merrill., <i>Menispermum cordifolium</i> Willd., <i>Cocculus cordifolius</i> DC, <i>Menispermum glabrum</i> Brum. f.</p>	Menispermaceae	Telakucha, Gulnoi	<p>Stem. The stem of the plant along with leaves of <i>Clerodendrum viscosum</i> are taken to treat viral fevers. The whole plant is also taken for gastrointestinal disorders. Juice squeezed from the whole plant is applied topically to treat muscle and joint ache.</p>
<p><i>Stemona tuberosa</i> Lour. Synonyms: <i>Stemona acuta</i> C. H. Wright</p>	Stemonaceae	Jongli shotomul	<p>Leaves, roots. Juice from the leaves and root clusters of the plant are taken during measles.</p>
<p><i>Moringa oleifera</i> Lam. Synonyms: <i>Guilandina moringa</i> L., <i>Moringa moringa</i> (L.) Small, <i>Moringa pterygosperma</i> Gaertn.</p>	Moringaceae	Sajna	<p>Fruit. Cooked and eaten twice daily to treat chicken pox. Fried leaves are taken as a diuretic. Paste of bark is applied for muscle ache. Dried leaves are taken with rice for treatment of edema.</p>

<p><i>Azadirachta indica</i> A. Juss. Synonyms: <i>Antelaeca azadirachta</i> (L.) Adelbert, <i>Melia azadirachta</i> L.</p>	<p>Meliaceae</p>	<p>Neem</p>	<p>Leaves. The leaves mixed with rhizomes of <i>Curcuma longa</i> are made into a paste and then applied topically to treat patients with chicken pox. The powdered bark, taken with salt and lime is considered anthelmintic. A paste of leaf along with rhizome of <i>Curcuma longa</i> is applied topically for treatment of skin diseases. Fried leaf is powdered and taken with rice for allergy.</p>
<p><i>Cyathula prostrata</i> L. Synonyms: <i>Achyranthes prostrata</i> L.</p>	<p>Amaranthaceae</p>	<p>Lal ura</p>	<p>Leaves. Juice from the leaves is taken by patients with rabies.</p>
<p><i>Amaranthus spinosus</i> L. Synonyms: <i>Amaranthus ascendens</i> Loisel., <i>Amaranthus lividus</i> L. convar. <i>ascendens</i>, <i>Amaranthus caracasanus</i> Kunth, <i>Amaranthus diacanthus</i> Raf., <i>Galliardia spinosa</i> (L.) Nieuwl.</p>	<p>Amaranthaceae</p>	<p>Kanta khudira, Kata note, Go shur, Champa natiya</p>	<p>Roots. A paste of roots containing 1:4 part black pepper is taken for rabies. The whole plant is taken for coughs and colds. A paste of the whole plant is applied topically to treat leucoderma. Juice from the roots is mixed with sugar and taken for diarrhea.</p>

<p><i>Calotropis procera</i> Ait. Synonym: <i>Asclepias procera</i> Ait.</p>	<p>Asclepiadaceae</p>	<p>Akondo</p>	<p>Sap. Sap from the plant is taken with brown sugar to treat rabies. Paste of leaf is heated in mustard oil and applied to affected areas for muscle ache. Juice from slightly dried leaves is taken with a little salt for coughs. Leaves and roots are also used to treat blood dysentery, leprosy, asthma, as an analgesic, and to treat insect bites. The leaves soaked in mustard oil are applied topically for treating edema during pregnancy.</p>
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