Use of plants as preventive medicine: a survey conducted in Devinagar village of Chapai Nawabganj district, Bangladesh

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ABSTRACT

During our various ethnomedicinal surveys, it was observed that the folk medicinal practitioners of the country advised consumption of various edible plants (including spices) both for cure, as well as towards reducing the chances of occurrence of certain diseases. Since prevention is always better than cure, it was important to document such preventive medicinal or functional food plants. Towards that, an interview was conducted of a folk medicinal practitioner in Devinagar village of Chapai Nawabganj district of Bangladesh, who advised the use of preventive medicinal food plants among the villagers. The practitioner advised consumption of 27 plants distributed into 21 families for preventive medicinal purposes. Among them, 8 plants were used normally as spices but according to the practitioner, also prevented or reduced the chances of occurrences of gastrointestinal disorders, heart disorders, biliary disorders, weakness, low sperm density, rheumatism, fever, coughs, and mucus. Thirteen plant parts were advised to be consumed to make up for any deficiency of vitamins, carbohydrates as well as macronutrients and micronutrients. Several plants were advised to be consumed to reduce the chances of occurrences of cholera, diabetes, weakness, heart disorders, gastrointestinal disorders, and mental depression. Taken together, the plants can prove to be useful preventive medicinal plants and reduce the health-related costs of people.

Key words: Functional food, preventive medicine, Devinagar, Bangladesh

Introduction

Functional foods began as a concept in the 1980s in Japan, where they were officially defined as “foods for specified health use.” Such foods can besides supply of macronutrients and micronutrients, do more for the body like boosting up the immune system or reducing the risks for diseases. Plant items are the most frequent source of functional foods, and plants that have the capacity to reduce the incidences of diseases are also known as preventive medicinal plants. Such plants may serve both therapeutic as well as preventive purposes. Plants contain various phytochemicals and these phytochemicals can play an important role in reducing occurrences of many diseases by boosting up various organ functions of the human body, by acting as antioxidants, and by supplying necessary nutrients. Since prevention is always better than cure, such preventive medicinal plants or functional food plants can play a vital role in maintaining the health status of the human population at a fraction of the cost that may be spent on medicines following incidences of diseases.

The effectiveness of plant sterols and stanols for lowering cholesterol and as such, reducing the chances for heart disorders have been shown (Kamal-Eldin and Moazzami, 2009). Various functional food plants like broccoli and other cruciferous vegetables, oat, flaxseed, tomato, soybean, citrus fruits, berries, tea, grapes and garlic have been reviewed for their health effects, and phytochemical ingredients contributing to the observed health effects (Rodriguez et al., 2006). It has been shown that stems of Asparagus officinalis and fruits of Momordica dioica can potentially serve as functional foods because of their high content of protein, carbohydrates, and minerals (Aberoumand, 2011). Four out of the nine medicinal plants studied, namely, Terminalia bellirica, Glycyrrhiza glabra, Syzygium aromaticum, and Phyllanthus emblica reportedly showed preventive activities against Streptococcus mutans – an organism causing dental caries (Chaiya et al., 2013). Medicinal plants for prevention and treatment of bacterial infections have been reviewed (Mahady, 2005). Twenty eight plants, many of them being spices, have been shown to be used for prevention and cure of digestive disorders in Punjab State, India (Sidhu et al., 2007). Several plants like Sanguisorba officinalis, Rosa chinensis, Millettia dielsanta, Polygonum cuspidatum, Caesalpinia sappan, and Sophora japonica have been shown to have high antioxidant activities and total phenolic contents, and thus can play a role in the prevention and treatment of cardiovascular and cerebrovascular diseases (Gan et al., 2010).

The use of medicinal plants for prevention and treatment of various ailments has also been described for Imo State in Nigeria (Nwachukwu et al., 2010). Selected medicinal plants for cancer prevention and therapy
have been reviewed (Bachrach, 2012). It can be then concluded that use of medicinal plants for preventive purposes is not an isolated phenomenon, but which takes place in various societies of the world on a daily basis. We have also noticed this use of medicinal plants for preventive and treatment purposes among the various ethnomedicinal surveys conducted by us among folk medicinal practitioners (Kavirajes) and tribal medicinal practitioners in Bangladesh (Nawaz et al., 2009; Rahmatullah et al., 2009a-c; Chowdhury et al., 2010; Hasan et al., 2010; Hussan 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., 2011; Jahan et al., 2011; Rahmatullah et al., 2011a,b; Sarkar et al., 2011; Shaheen et al., 2011; Das et al., 2012; Hasan et al., 2012; Hussan et al., 2012; Khan et al., 2012; Rahmatullah et al., 2012a-d; Sarkar et al., 2012). Two such exclusive surveys on medicinal plants used for preventive purposes have also been documented (Biswas et al., 2011d; Rahmatullah et al., 2011c). Since a substantial number of the rural population of Bangladesh are poor and cannot afford high health costs, it can be beneficial if more uses of preventive medicinal plants can be documented. The objective of this survey was to document the preventive medicinal plants used in Devinagar village of Chapai Nawabganj district, Bangladesh.

Materials and Methods

The present survey was carried out in Devinagar village, which lies within Chapai Nawabganj district of Bangladesh. The village had one elderly person, who practiced folk medicine and advised the villagers on medicinal plants and formulations to be used for both preventive and therapeutic purposes. The person, Matiur Rahman was popularly called ‘Nana’, meaning grandfather. He was aged about 70 years and Muslim in religion, and belonged to the mainstream Bengali-speaking population. After learning about this person in an ethnomedical survey conducted in the village, he was interviewed as to the preventive medicinal plants, which he advised the villagers to partake for treatment and prevention of various diseases. Informed consent was first obtained from him, and interviews conducted in the form of open-ended interviews in the Bengali language, which was also spoken by the interviewers. Medicinal plants as mentioned by him were collected in his presence. Plant specimens were also photographed on the spot and brought back to Dhaka to be identified by Mr. Manjur-Ul-Kadir Mia, ex-Curator and Principal Scientific Officer of the Bangladesh National Herbarium.

Results and Discussion

A total of 27 plants used for preventive medicinal purposes were obtained from the practitioner. These plant species were distributed into 21 families. Of the 27 plants obtained, 8 plants or plant parts were used as spices. The practitioner, although a rural folk medicinal practitioner, was observed to possess a good knowledge of vitamins, minerals, and other macronutrients and micronutrients necessary to maintain good health in the human body. In fact, thirteen plants were advised by him to partake to fulfill any deficiencies of vitamins, macronutrients, and micronutrients. The results are shown in Table 1.

Table 1: Preventive medicinal plants and mode of their consumption advised by the folk medicinal practitioner of Devinagar village in Chapai Nawabganj district, Bangladesh.

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Scientific name of plant</th>
<th>Family</th>
<th>Local name</th>
<th>Part(s) used</th>
<th>Ailment(s) prevented and mode of taking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mangifera indica L.</td>
<td>Anacardiaceae</td>
<td>Aam</td>
<td>Fruit</td>
<td>Vitamins B and C, calcium, and iron deficiency. Fruits are eaten directly.</td>
</tr>
<tr>
<td>2</td>
<td>Foeniculum vulgare Mill.</td>
<td>Apiaceae</td>
<td>Mouri</td>
<td>Seed</td>
<td>Loss of appetite, indigestion, foul odor in mouth. Used as spice and also chewed directly.</td>
</tr>
<tr>
<td>3</td>
<td>Basella alba L.</td>
<td>Basellaceae</td>
<td>Puin shak</td>
<td>Young leaf, stem</td>
<td>Vitamin deficiency. Young leaves and stems are cooked and eaten as vegetable.</td>
</tr>
<tr>
<td>5</td>
<td>Carica papaya L.</td>
<td>Caricaceae</td>
<td>Pepe</td>
<td>Ripe and unripe fruit</td>
<td>Iron, calcium, phosphorus, vitamin A, and vitamin C deficiency, constipation, diphtheria, cancer. Ripe fruits are eaten directly. Unripe fruits are cooked and eaten as vegetable.</td>
</tr>
<tr>
<td>6</td>
<td>Ipomoea batatas (L.) Lam.</td>
<td>Convolvulaceae</td>
<td>Mishti alu</td>
<td>Tuber</td>
<td>Carbohydrate deficiency. Rhizomes are either eaten in the boiled form or cooked and eaten</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Scientific Name</th>
<th>Family</th>
<th>Part Used</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Brassica oleracea var. botrytis L.</td>
<td>Cruciferae</td>
<td>Floral bud</td>
<td>Vitamin deficiency. Young floral buds are cooked and eaten as vegetable.</td>
</tr>
<tr>
<td>8</td>
<td>Cucurbita maxima Duchesne</td>
<td>Cucurbitaceae</td>
<td>Mishi kumra, Unripe and ripe fruit</td>
<td>Vitamin A deficiency. Fruits are cooked and eaten as vegetable.</td>
</tr>
<tr>
<td>9</td>
<td>Lagenaria siceria (Mol.) Standl.</td>
<td>Cucurbitaceae</td>
<td>Lau, Young fruit</td>
<td>Cholera. Fruits are cooked and eaten as vegetable.</td>
</tr>
<tr>
<td>10</td>
<td>Momordica charantia L.</td>
<td>Cucurbitaceae</td>
<td>Ucche, Korolla, Fruit</td>
<td>Diabetes. Juice from fruits is taken orally. Fruits are also cooked and eaten as vegetable.</td>
</tr>
<tr>
<td>11</td>
<td>Allium cepa L.</td>
<td>Liliaceae</td>
<td>Piyaj, Floral stem</td>
<td>Weakness, low sperm density. Used as spice.</td>
</tr>
<tr>
<td>12</td>
<td>Allium sativum L.</td>
<td>Liliaceae</td>
<td>Roshun, Floral stem</td>
<td>Heart disorders, rheumatism. Used as spice.</td>
</tr>
<tr>
<td>13</td>
<td>Abelmoschus esculentus (L.) Moench.</td>
<td>Malvaceae</td>
<td>Dherosh</td>
<td>Physical weakness. Young fruits are cooked and eaten as vegetable.</td>
</tr>
<tr>
<td>14</td>
<td>Artocarpus heterophyllus Lam.</td>
<td>Moraceae</td>
<td>Kathal, Ripe and unripe fruit, seed</td>
<td>Vitamin A deficiency. Ripe fruits are eaten directly. Unripe fruits and seeds are cooked and eaten as vegetable.</td>
</tr>
<tr>
<td>15</td>
<td>Musa sapientum L.</td>
<td>Musaceae</td>
<td>Kola, Fruit</td>
<td>Vitamins A, B, C, D and E deficiency. Ripe fruits are eaten directly.</td>
</tr>
<tr>
<td>16</td>
<td>Psidium guajava L.</td>
<td>Myrtaceae</td>
<td>Peyara, Fruit</td>
<td>Vitamins A and C deficiency. Fruits are eaten directly.</td>
</tr>
<tr>
<td>18</td>
<td>Ziziphus mauritiana Lam.</td>
<td>Rhamnaceae</td>
<td>Kul, Boroi, Fruit</td>
<td>Vitamin C deficiency. Fruits are directly eaten.</td>
</tr>
<tr>
<td>19</td>
<td>Coffea arabica L.</td>
<td>Rubiaceae</td>
<td>Coffee, Seed</td>
<td>Weakness. Seeds are boiled in water followed by drinking the water.</td>
</tr>
<tr>
<td>20</td>
<td>Aegle marmelos (L.) Corr.</td>
<td>Rutaceae</td>
<td>Bel, Ripe fruit</td>
<td>Hotness of body, gastrointestinal disorders. Ripe fruits are eaten directly.</td>
</tr>
<tr>
<td>21</td>
<td>Litchi chinensis Sonn.</td>
<td>Sapindaceae</td>
<td>Lichu, Fruit</td>
<td>Deficiency of Vitamin C and carbohydrates, skin disorders. Ripe fruits are eaten directly.</td>
</tr>
<tr>
<td>22</td>
<td>Capsicum frutescens L.</td>
<td>Solanaceae</td>
<td>Morich, Unripe fruit, Dried ripe fruit</td>
<td>Fever. Used as spice.</td>
</tr>
<tr>
<td>23</td>
<td>Solanum melongena L.</td>
<td>Solanaceae</td>
<td>Baegun, Fruit</td>
<td>Vitamins A and C deficiency, iodine deficiency. Fruits are fried and eaten. Alternately, fruits are boiled in water and eaten in the mashed form.</td>
</tr>
<tr>
<td>24</td>
<td>Camellia sinensis (L.) O. Kuntze</td>
<td>Theaceae</td>
<td>Cha, Young leaf</td>
<td>Heart disorders, mental depression, tiredness. Young leaves are boiled in water and the water taken orally.</td>
</tr>
<tr>
<td>25</td>
<td>Coriandrum sativum L.</td>
<td>Umbelliferae</td>
<td>Dhonia, Young leaf, seed</td>
<td>Biliary disorders, bloating, indigestion, weakness. Used as spice.</td>
</tr>
<tr>
<td>26</td>
<td>Curcuma longa L.</td>
<td>Zingiberaceae</td>
<td>Holud, Rhizome</td>
<td>Coughs, bloating, indigestion. Used as spice.</td>
</tr>
<tr>
<td>27</td>
<td>Zingiber officinale Roscoe</td>
<td>Zingiberaceae</td>
<td>Ada, Rhizome</td>
<td>Indigestion, coughs, mucus. Used as spice.</td>
</tr>
</tbody>
</table>

The eight spice plants advised by the practitioner to be taken as spices (i.e. used in cooking) were *Foeniculum vulgare* (for prevention of loss of appetite, indigestion, and so as to not have foul odor in mouth), *Allium cepa* (to be taken to prevent weakness and low sperm density), *Allium sativum* (to prevent heart disorders and rheumatism), *Syzygium aromaticum* (to prevent coughs), *Capsicum frutescens* (to prevent fever), *Coriandrum sativum* (to prevent biliary disorders, bloating, indigestion, and weakness), *Curcuma longa* (to prevent coughs, bloating, and indigestion), and *Zingiber officinale* (to prevent indigestion, coughs, and mucus formation). The practitioner mentioned that regular partaking of these plant parts as spices would prevent the mentioned ailments from occurring. However, he also mentioned that these spices can be taken following actual occurrence of the ailments mentioned against each individual spice.

The major occupation of the rural population of Bangladesh is agriculture. This occupation necessitates hard physical labor, especially during planting and harvesting times, and this labor has to be done under hot sun...
or rain, as the weather may be. A substantial number of the rural population is also poor and cannot have their dietary requirements fulfilled all the time. Moreover, due to absence of proper sanitation facilities and quality drinking water, the people suffer from gastrointestinal disorders. As a result, the major problems that the rural population faces are gastrointestinal disorders, physical weakness, and lack of macronutrients and micronutrients, including vitamins (lack of which can also cause physical weakness besides other diseases). The majority of the plants or plant parts advised to be consumed by the practitioner were for the prevention of the above three classes of disorders. As noted before, the practitioner suggested a number of spices to be eaten in the cooked form to prevent several types of gastrointestinal disorders like loss of appetite, indigestion, and bloating. To prevent physical weakness (which can be caused by hard labor or lack of nutrients or both), the practitioner advised consumption of ripe fruits of *Artocarpus heterophyllus* (jackfruit), *Momordica charantia* (watermelon), *Basella alba* (spinach leaves), *Capsicum frutescens* (a spice), *Allium cepa* (a spice). Thus spices fulfilled the role of prevention of gastrointestinal disorders, physical weakness, as well as other ailments, as mentioned in the previous section. It is to be noted that various spices like *Allium cepa*, *Zingiber officinale*, *Foeniculum vulgare*, and *Allium sativum* are also used in Punjab State of India to prevent or alleviate digestive disorders (Sidhu et al., 2007). Besides spices, the practitioner also advised consumption of ripe fruits of *Aegle marmelos* to prevent gastrointestinal disorders. It is to be noted that fruits of this plant are considered stomachic and digestive throughout the Indian sub-continent, including Bangladesh.

Consumption of fruits, especially in the form of sherbet are believed to have a cooling effect on the body as well as the stomach in hot and humid weather, when the body gets heated and various digestive problems arise. The seeds of *Coffea arabica* (coffee), when boiled in water and the water taken orally can act as a stimulant for its caffeine content, and so can reduce physical weakness, at least temporarily. The practitioner also advised consumption of thirteen different plant parts for prevention of deficiency of macronutrients and micronutrients. For instance, fruits of Mangifera indica were advised to be consumed to prevent deficiencies of calcium, iron, and vitamins B and C. The fruits have been reported to contain a high level of ascorbic acid or vitamin C (Duke, 1992). *Basella alba* leaves and stems were also advised by the practitioner to prevent vitamin deficiency. The leaves and stems of this plant reportedly contain vitamin C, carbohydrates, fat, as well as the amino acids alanine, arginine, glutamic acid, leucine, isoleucine, lysine, threonine, tryptophan, tyrosine, and valine (Duke, 1992). Fruits of *Ananas comosus* are also known to have high content of vitamin C and calcium. The core of the fruit is advised to be taken by folk medicinal practitioners in Bangladesh along with leaf juice to both prevent and treat helminthic infections. Notably, the practitioner advised eating the fruit of this plant to reduced vitamin and mineral deficiency as well as to prevent helminthic infections.

Ripe and unripe fruits of *Carica papaya* were advised by the practitioner to be consumed to prevent iron, calcium, phosphorus, vitamin A, and vitamin C deficiency as well as to prevent constipation, diphtheria, and cancer. The ripe fruits reportedly contain high levels of vitamins A and C, as well as phosphorus, calcium, iron, and potassium. The fruits are also known to contain alpha-linolenic acid, fats, fiber, germacrene D, mono-unsaturated fatty acids, and lycopene (Duke, 1992). Fibers present within the fruit can help relieve as well as prevent constipation. Lycopene is a strong antioxidant and has been shown to be associated with decreased risks of cancer and cardiovascular diseases (Rao and Agarwal, 2000). Fruits of *Artocarpus heterophyllus* (jackfruit), which were advised to be consumed by the practitioner to prevent vitamin A deficiency, are known to contain vitamin A, vitamin C, thiamin, riboflavin, niacin, calcium, potassium, iron, sodium, and zinc (Swami et al., 2012). Thus the advice given by the practitioner regarding consumption of this fruit (along with several others already mentioned plants) has been validated in nutritional analysis of relevant plant parts.

The anti-diabetic effects of fruits of *Momordica charantia* are well established (Joseph and Jini, 2013); the practitioner advised regular consumption of fruits to prevent diabetes. The practitioner also advised consumption of all fruits of *Allium sativum* (garlic) has also been reviewed (Ginter and Simko, 2010). Fruits of *Musa sapientium* (banana), which were advised by the practitioner to consume to prevent deficiency of vitamins A, B, C, D, and E are known to have high contents of vitamin C and beta-carotene, the latter being a precursor of vitamin A (Wall, 2006a). Fruits of *Psidium guajava* (guava) were advised by the practitioner to consume to prevent vitamins A and C deficiency; the fruits have been reported to contain high levels of vitamin C, carotene, and retinol equivalent (Rahmat et al., 2006). *Syzygium aromaticum* (clove) was mentioned by the practitioner to prevent coughs; traditional uses of cloves for such treatment in India have been reported (Bhowmik et al., 2012). *Litchi chinensis* fruits have good vitamin C content (Wall, 2006b); the practitioners advised consumption of fruit to prevent deficiency of vitamin C. Consumption of hot peppers (fruits of *Capsicum frutescens*) has been reported as a traditional way to cure fevers (Milind and Sushila, 2012); the practitioner advised consuming the fruits as a way both to prevent and to cure fever.

It may clearly be concluded that the practitioner had a quite sound knowledge on the medicinal properties of various plants, which he used for both preventive and therapeutic purposes. How this knowledge was derived remains a question. Rural areas are no longer remote areas in Bangladesh; they are in fact connected to the whole world via the Internet, and many households have televisions and radios at present. Newspapers also circulate in the rural areas. Moreover, primary education has been made compulsory, and most rural residents know about vitamins and other micronutrients and macronutrients through the availability of easy to read books.
on nutrition. The practitioner could easily have picked up his knowledge from diverse sources like the ones mentioned above. The knowledge may also have been transmitted through experiences gathered over successive generations, as frequently happens with folk medicinal practitioners. Nevertheless how this knowledge was gained, it now remains for science to research on the preventive medicinal plants used by the practitioner on which scientific validations are still lacking, like plants used for prevention of cholera, rheumatism, mental depression, and biliary disorders.

References


Wall, M.M., 2006b. Ascorbic acid and mineral composition of longan (Dimocarpus longan), lychee (Litchi chinensis) and rambutan (Nephelium lappaceum) cultivars grown in Hawaii. Journal of Food Composition and Analysis, 19: 655-663.