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## Herbal formulations for jaundice treatment in Jamalpur district, Bangladesh

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#### Abstract

Jaundice is a condition where levels of bilirubin in blood goes above normal levels due to disorders of the liver. This condition is characterized by yellow tinge of skin and the eyes. Since jaundice can be a manifestation of serious hepatic disorders like cirrhosis or hepatitis, it is important that jaundice be taken care of and liver brought to its normal state in a short period of time. Rural people of Bangladesh mostly rely on folk medicinal practitioners for treatment of diseases. We here present two plant-based formulations administered by a practitioner in Jamalpur district of Bangladesh for treatment of jaundice, and discuss the scientific evidence and relevancy of the plants used by the practitioner as hepatoprotective agents and their possible therapeutic efficacy against jaundice.

**Keywords:** Folk medicine, phytotherapy, jaundice, Jamalpur, Bangladesh

#### Introduction

Since primitive time people have been using natural products, mainly plants to attenuate or treat diseases <sup>[1]</sup>. According to the World Health Organization (WHO), people are turning to traditional medicine (TM) worldwide because of its availability and affordability. People who have been suffering from chronic diseases are also moving towards TM as they are now more and more shown to be scientifically validated in their uses <sup>[2]</sup>. Usually the knowledge of this practice is transferred in different generation orally <sup>[3]</sup>. Among TM, folk medicinal practice in Bangladesh is quite popular and is considered as primary level treatment <sup>[4]</sup>. Generally people who practices folk medicine are Kavirajes among the mainstream population and tribal practitioners among the tribal communities who generally possess good knowledge about the phytotherapeutic effectiveness of plants <sup>[5-9]</sup>.

The word jaundice originates from the French word *jaune* meaning yellow. Jaundice mainly can be defined as high bilirubin level in the body. Symptoms of jaundice are manifested by yellowing of skin, mucous membranes, and sclera because a yellow-orange bile pigment bilirubin deposits in blood, which is produced from breakdown of heme rings <sup>[10, 11]</sup>. Jaundice only can occur when serum bilirubin level exceeds 3 mg per dL, which happens due to disruption in bilirubin metabolic pathway. Increased red blood cell destruction causes increase in unconjugated bilirubin and hepatocellular damage or biliary tract obstructions cause increases in conjugated bilirubin <sup>[12]</sup>.

A recent survey done in five rural communities of Bangladesh with 125,570 population showed that 60 persons over the age of 14 die due to jaundice and a mother who was suffering from jaundice for 3 years gave four stillbirths <sup>[13]</sup>. From the data it can be estimated the rate of death or surviving patient associated with jaundice. Jaundice itself cannot be cured but its symptoms and causing factors can be. Generally in Bangladesh, people use home remedies to reduce the symptoms of jaundice. Kavirajes and different communities of people also use different plants against jaundice. Some plants used against jaundice in Bangladesh are shown in Table 1. Since medical science always tries to find better medications for treatment, the objective of this study was to document folk remedies against jaundice in Jamalpur district of Bangladesh.

#### Materials and Methods

The survey was done by interviewing a folk medicine practitioner (FMP), Md. Mostafizur Rahman, aged 42, in Pashchim Nayapara area, Jamalpur district, Bangladesh.

Information was collected with the help of a semi-structured questionnaire and the guided field-walk method of Martin [24] and Maundu [25]. In this method the FMP gave two formulas of two different plants for the treatment of jaundice. The FMP took the interviewers to the location to acquaint them with the plants. Plant specimens were then collected and preserved for Herbarium identification by pressing and drying them in the field.

### Result and Discussion

The FMP supplied two plant formulations containing as the main ingredient plants, *Azadirachta indica* A. Juss. (Meliaceae) and *Leucas aspera* (Willd.) Linn. (Lamiaceae). The plants are known as neem and domkolosh, respectively in Bengali (local language). The first formulation was made by using the plant's bark and honey. Bark of *A. indica* was crushed for collecting the juice. Fifty grams of the juice were then mixed with equal amount of honey. The mixture was advised to be taken orally once daily on an empty stomach for 3-4 days.

The second formulation was prepared by taking a handful of leaves of *L. aspera*, which were then crushed to collect juice. Juice was then advised to be applied to eyes 3-4 times a day until cure.

*Azadirachta indica* A. Juss, is a medicinal plant widely used by FMPs in Bangladesh for its effectiveness against diverse diseases including pain [26], gastrointestinal disorders, malaria fever, diabetes, insect repellent, and skin diseases [27]. The plant possesses numerous phytochemicals like nimbolinin, nimbin, nimbidin, quercetin, azadirachtin, nimbolide, ascorbic acid, 17-hydroxyazadiradione, n-hexacosanol, which have been found to be effective against various diseases. The main active compound azadirachtin is toxic for insects; two of the plant limonoids, azadirachtin and nimbolide reportedly induced cell cycle arrest and apoptosis in human cervical cancer (HeLa) cells [28]. Phytochemicals of the plant also have been found hepatoprotective without any adverse effect. Azadirachtin-A and nimbolide gave hepatoprotective activity in carbon tetrachloride induced hepatotoxicity in rats. Leaf extract of *A. indica* showed significant result in lessening serum bilirubin level [29], which can be a supporting evidence of the efficacy of the given formulation.

Honey is known traditionally as 'Mohoushodh' (great medicine) and is obtained from nectar of flower which is then

digested in the body of honey bees and stored in honeycomb. This luscious, viscous fluid is used in traditional treatment as it comprises chemicals produced from flowers. Honey contains phenolic acid, ascorbic acid, catalase, tocopherols, and antibiotic rich inhibin [30]. It is also flavonoid rich, containing luteolin, quercetin, apigenin, fisetin, kaempferol, isorhamnetin, acacetin, tamarixetin and chrysin. An experiment gave evidence of hepatoprotective effect of flavonoids of honey which is caused by obstructive jaundice leading to oxidative injury in hepatocytes [31]. From the published report, it is clear that using honey in jaundice treatment is rational. It should also be pointed out that besides therapeutic efficacy of its own honey has a sweet taste, which can make any bitter compound (like bark juice of *A. indica*) more palatable for consumption.

Besides having an attractive combination of white flower and green leaves, *L. aspera* also contains healing properties. From several ethno surveys, the plant has been found to be used for stimulation, asthma, dyspepsia, inflammation, jaundice, toothache, and snake bite. Reported phytochemicals are alkaloids, flavonoids (catechin, acacetin, apigenin, chrysoerol), saponins, terpenoids (oleanolic acid, leucasperone A, leucasperone B, leucasperone C), steroids, tannins, glycosides (glucoside, linifolioside, leucasperoside A, leucasperoside B, leucasperoside C). Plant extract has been examined for confirming hepato-protective activity and the result was significant [32-34].

From the above discussion it can be concluded that both plants used for jaundice can be possible sources of novel compound(s), which may lead to the discovery of new drug(s) for the treatment of jaundice. As *A. indica* extract has the ability to reduce bilirubin level, further investigations may elucidate the mechanism and there can be a finding of a lead compound.

Jaundice is a serious problem in Bangladesh. One in five maternal deaths in Bangladesh is associated with acute jaundice [35]. Outbreaks of hepatitis E (which can cause jaundice) have been reported for Bangladesh [36]. As a result, low-cost therapy in the form of phytotherapy (provided the plants have been scientifically validated to alleviate jaundice) may prove to be the best answer for the rural low-income people of Bangladesh, who lack access to modern hospitals and doctors. Such approaches are increasingly in use also in other parts of the world [37, 38].

**Table 1:** Some plants used by folk medicinal practitioners of Bangladesh to treat jaundice.

Scientific Name (Family Name)	Local Name	Part Used	Formulation and usage	Reference
<i>Streblus asper</i> Lour. (Moraceae)	Shaora gach	Leaf	Jaundice. Leaf juice is taken orally.	[14]
<i>Dioscorea belophylla</i> (Dioscoreaceae)	Khoia aloo	Leaf	Leaf juice is taken for jaundice.	[15]
<i>Moringa oleifera</i> Lam. (Moringaceae)	Sajna	Leaf, Stem	Juice from leaf and stem are taken for jaundice.	[16]
<i>Lagenaria siceraria</i> (Cucurbitaceae)	Lau	Leaves, fruits, seeds, roots, stems	Jaundice. The various parts are consumed individually or in combination.	[17]
<i>Kalanchoe pinnata</i> (Crassulaceae)	Pathorkuchi	Leaf	For jaundice a handful of leaves of the plant are macerated. Juice is mixed with a banana and yogurt. Mixture is taken (125 ml twice daily for a week).	[18]
<i>Vitex negundo</i> L. (Verbenaceae)	Nishinda	Root	Juice of roots is taken in an empty stomach for jaundice.	[19]
<i>Mimosa pudica</i> L. (Fabaceae)	Lozzaboti	Stem	To treat jaundice, garland of stem of the plant is kept over the head.	[20]
<i>Justicia adhatoda</i> L. (Acanthaceae)	Bashok	Leaf	Leaf juice is orally taken for jaundice.	[21]
<i>Averrhoa carambola</i> L. (Oxalidaceae)	Kamranga	Fruit	Ripe fruits are eaten for jaundice.	[22]
<i>Cajanus cajan</i> (L.) (Fabaceae)	Arhar	Leaf	Leaf juice is taken orally for jaundice.	[23]

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