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Full Length Research Paper

Medicinal plants used for the treatment of jaundice and hepatitis based on socio-economic documentation

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The present study deals with socio-economic documentation of medicinal plant species against jaundice and hepatitis. A total of 30 plant species belonging to 24 families were reported by local practitioners for the treatment of jaundice and hepatitis. The most important plant species are *Adiantum capillus, Boerhaavia procumbens, Equisetum debile, Carissa opaca,Cucumis sativus, Hordeum vulgare, Justacia adhatoda, Morus alba, Morus nigra, Phyllanthus emblica, Phyllanthus niruri, Plantago ovata, Prunus domestica, Punica granatum, Raphnus sativus, Rhus chinensis, Saccharum officinarum* and *Tamarandus indica*.

Key words: Medicinal plants, jaundice, hepatitis, Socio-economic documentation.

INTRODUCTION

From the very beginning of human existence, man has familiarized himself with plants and used them in a variety of ways throughout the ages. In search of food and to cope successfully with human suffering, primitive man began to distinguish those plants suitable for nutritional purpose from others with definitive pharmacological action. This relationship has grown between plants and man, and many plants came to be used as drugs. The growth of knowledge to cure disease continues at an accelerating pace, and number of new plant-derived drugs increase likewise. Herbal medicine is currently experiencing a revival in Western society, along with other complementary therapies such as traditional Chinese Medicines, Osteopathy and Homeopathy (Shinwari and Gilani, 2003).

Jaundice is not a disease but rather a sign that can occur in many different diseases. Jaundice is the yellowish staining of the skin and sclera (the whites of the eyes) that is caused by high levels in blood of the chemical bilirubin. The colour of the skin and sclera vary depending on the level of bilirubin. When the bilirubin level is mildly elevated, they are yellowish. When the bilirubin level is high, they tend to be brown (Wahab et al., 2004). Jaundice may result from various diseases or conditions that affect the liver, like Hepatitis A, Hepatitis B, Hepatitis C, Hepatitis D, Hepatitis E, Autoimmune hepatitis, Liver cirrhosis, Liver cancer, Hemolytic anaemia and Malaria.

There is no unique treatment for jaundice and hepatitis by prescribing modern allopathic and homeopathic medicine. Although different workers have documented medicinal plants from various regions of world, but to our knowledge no systematic investigation on Antiviral application of medicinal plants against jaundice and hepatitis has been made which was based on socio-economic conditions of respondent communities. In this context, the present study is the first milestone with particular emphasis on antiviral application of medicinal plants for jaundice and hepatitis.

METHODS

In the present investigation we focused on medicinal plants used to treat jaundice and hepatitis. The study was carried out by interviewing respondents in thirty remote sites. The respondents were old age women, men, and healers themselves and had knowledge on the medicinal use of the plants for the said purpose. To collect data systematically on jaundice treatment questionnaires, semi-structured interviews and discussions were applied, included questions that target the local name of plant, parts used, methods

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of preparation and application. A total of 95 informants including 45 female, 40 male and 10 traditional healers were interviewed. Collected data was also cross checked in different areas from local informants either by showing the plant specimen or telling local names to the informants to verify the authenticity of claims. For chemical constituents prior informed consent (PIC) was used in carrying out this work (Table 1). Information on the chemical constituents of the plants reported under present investigation has been compiled from relevant sources (Nadkarni, 1976; Ikram and Hussain, 1978; Tyler et al., 1981; Haq and Rehman, 1990; Haq and Hussain, 1993; Hussein, 1983; Mangrio et al., 1995; Zafar and Ali, 1998; Prajapati et al., 2006).

Plants were collected in flowering and fruiting conditions and confirmed by using different herbaria. Specimens were dried, pressed, poisoned and mounted on herbarium sheets. All collected specimens were identified with the help of available literature (Nasir and Ali, 2002) and herbarium, Quaid-i-Azam University, Islamabad Pakistan. After correct identification, the specimens were deposited in Quaid-i-Azam University Herbarium, Islamabad for future references.

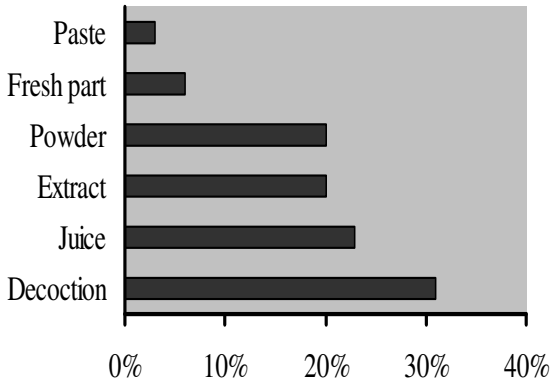

Figure 1. Methods of preparation of the medicinal plants used locally for the treatment of jaundice and hepatitis.

RESULTS AND DISCUSSION

Data obtained from present investigation is compiled in Table 1 and the plants species are arranged in alphabetic order. A total of 30 plant species belonging to 24 families have been reported for the treatment of jaundice and hepatitis. For each plant species botanical name, family, local name, parts used, chemical constituents, preparation and application are provided. The most dominating families were Astraceae with three species, followed by Anacardiaceae, Euphorbiaceae, Moraceae and Poaceae of two species each. Some of the highly utilized plant species include *Adiantum capillus*, *Boerhaavia procumbens, Equisetum debile*, *Carissa opaca*, *Cucumis sativus*, *Hordeum vulgare*, *Justacia adhatoda*, *Morus alba*, *Morus nigra*, *Phyllanthus emblica*, *Phyllanthus niruri*, *Plantago ovata*, *Prunus domestica*, *Punica granatum*, *Raphnus sativus*, *Rhus chinensis, Saccharum officinarum* and *Tamarandus indica* (Table 1).

Different plant parts were used to cure jaundice and hepatitis. Among these fruits were highly utilized followed by leaves, whole plant, roots, seeds, stem and flowers in decreasing order (Table 1). Data presented in Table 1, shows that thirty five medications were used for jaundice and hepatitis that can be divided into two categories: those that prepared from (i) single plant and (ii) from more than one plant species. In majority of the cases these medications were prepared by using water as a medium and administrated along with water and sugar. The method of preparation falls into six categories (Figure 1), plant parts used in the form of decoction (31%), juice (23%), extract (20%), powder (20%), fresh part (6%) and paste (3%). In all the cases mode of application was oral. In regard to the patient conditions, the preparations were use more than two times daily from a week to month till the problem is cured.

Jaundice results from various diseases or conditions that affect the liver. Mostly it is due to viral hepatitis A, B, C, D and E, liver cirrhosis and liver cancer. Some of the plant species mentioned in the present study used to cure jaundice and hepatitis have been investigated for their antimicrobial activities. For example the hexane and alcoholic extracts of *P. embilica* (fruit), *T. indica* (fruit) and *P. granatum* (fruit - pericarp) were found to be anti-microbial while *J. adhatoda* (leaves, roots), *Cichorium intybus* (whole plant), *Morus alba* (fruit) and *Myrsine africana* (fruit) show no antimicrobial activity (Ahmad et al., 1998). Ethanolic extract from the leaves of *Oxalis corniculata* have significant nematodical properties (Qarar et al., 1998). Methanolic extracts of *Carissa* and *Rumex* were found to be most active against herpes simplex virus, Sindbis virus and poliovirus (Taylor et al., 1996). Crude extracts of *P. ovata* (seeds) and *Raphanus sativus* (seeds) show no antibacterial and antifungal activity (Kumar et al., 2006). Aqueous extract of *T. indica* (fruit) shows positive response against antimicrobial activity, while that of *B. procumbens* (whole plant) shows no response (Srinivasan et al., 2001). According to Prajapati et al. (2006) *R. chinensis* shows antibacterial, antiviral and antifungal activities

By comparing these plant species recorded to cure jaundice and hepatitis with available pharmacological literature reported from other regions of the subcontinent and world, it appears that there are many medicinal plant species in the area that were not reported in other locations. To our knowledge the use of *Adiantum capillus*, *Argyrolobium roseum*, *Equisetum debile*, *Carissa opaca*, *Phyllanthus embilica*, *Segeretia brandrethiana*, *Viola serpens*, *Plantago ovata*, *Woodfordia fruticosa, Saccharum officinarum* and *Prunus domestica* to cure jaundice, have never been reported before.

Decoction from fresh leaves of *A. capillus* is taken orally to cure jaundice in the study areas, while (Ahmed et al., 2007; Natale and Pollio, 2007; Ghorbani, 2005; Dastagir, 2001; Inam et al., 2000; Shinwari and Khan, 2000) reported that the same plant is used as aromatic, emollient, febrifuge, astringent, diuretic, emetic, expectorant, tonic, and used to cure diarrhoea, dysentery, cough, asthma, regular menses and respiratory ailments. Leaf

Table 1. Medicinal plants used locally to treat jaundice and hepatitis.

Botanical name Local name/ family	Part used	Chemical constituents	Preparation and application
Adiantum capillus veneris L. Sarhaj Adiantaceae	Leaves	Flavinoids, terpenoids, tannins, mucilage, volatile oil, capillerine, mucin, gallic acid, sugar, kaempferol, quercetol and luteol (Prajapati et al., 2006)	Fresh leaves are boiled in water along with sugar. One cup of the decoction is taken orally twice a day for a week.
Argyrolobium roseum (Comb) Jaub & Spach. Makhni booti Papilionaceae	Whole plant	Flavonid glycoside (Gupta et al., 2005). Vitexin and D-pinitol (Ram et al., 2007)	Fresh plant material is crushed and mixed along with water and sugar. One cup of juice is taken orally early at morning for two weeks.
Berberis lycium Royle. Sumbul Berberdiaceae	Leaves	Alkaloids umbellatine, barberin, barbamine, starch grains and tannins (Tyler et al., 1981)	Fresh leaves are boiled in water and the decoction is given to the patient thrice a day for two to three weeks.
Boerhaavia procumbens L. Itsit Nyctaginaceae	Whole plant	Alkaloids, tricontanol, hentriacontane, sitosterol, ursolic acid, flavone, glucose, fructose and sucrose (Prajapati et al., 2006)	Fresh plant material is boiled in water along with sugar. Half cup of the decoction is given to the patient thrice a day for three weeks.
Equisetum debile Roxb Satgandi booti Equisetaceae	Whole plant	Moisture, ash, lipid, protein, Na, K, Ca, P, Cb, Cu, Ni, Zn, Cr, carbohydrates, ascorbic acid, folic acid and niacin (Mangrio et al., 1995)	One cup of juice from fresh plant material is mixed with sugar and is taken orally twice a day for two weeks.
Carissa opaca Stapf.ex.Haines. Garanda Apocynaceae	Leaves	Carissone, palmatic acid, benzyl salicylate, benzyl benzoate, α-farnesene (Rai et al., 2005)	Fresh leaves of *C. opaca* and roots of *S. brandrethiana* are boiled in water. One cup of the decoction is taken orally twice a day for two to three weeks.
Cichorium intybus L. Kasni Astraceae	Whole plant	Gummy water, cellulose, inulin, fiber, ash, glycoside, stearin, mannites, tartaric acid, betaine, choline, lactones, esculine, esculetin, cichoriin, umbelliferone, scopoletin, 6,7-dihydroxy caumarin, volatile matter, anthocynin, fatty acid, methyl esters, vanillin, 5-hydroxy methyl 2-furfural, 2-acetylpyrole, furfural, phenyl acetic acid, 2-(5-hydroxy methyl 2-formylpyrol-1-yl)-3-methyl-3-pentanoic lactone, and phenylacetaldehyde (Zafar and Ali 1998)	Fresh plant material is boiled along with sugar. Half cup of the decoction is given to the patient thrice a day for two weeks.
Cucumis sativus L. Kheera Cucurbitaceae	Fruit	Methyl-phytosterol, amyrin, multiflorenol, methylenecy-cloartenol, cycloartenol, tirucallol, protein, isopentenyl adenosine trialcolhol (Prajapati et al., 2006)	Fresh fruit is cut into small pieces and is given to the patient thrice a day for a month.
Cuscuta reflexa Roxb Nelathri Cuscutaceae	Whole plant	Scoparone, melanettin, quercetin, hyperoside, phenolic compounds, and caffeoylquinic acids (Prajapati et al., 2006)	Fresh plant material is cocked and three to four teaspoons of the paste are taken orally once a night for two weeks.
Hordeum vulgare L. Jou Poaceae	Seeds	Arginine, histidine, lysine, tyrosine, tryptophan, phenylalanine, cystine, methionine, threonine, leucine, isoleucine, valine and glycine (Prajapati et al., 2006)	Dried seeds are grounded. Powder is mixed with water and sugar is taken orally thrice a day for a month.

Table 1. Contd.

Justacia adhatoda L. Bahker Acanthaceae	Roots	Essential oils, alkaloids vasicine, vasicinone, deoxyvasicine, maiontone, vasicinolone, vasicol, peganine, sitosterol, glucoside and kaempferol (Prajapati et al., 2006)	Fresh roots are boiled in water. Half cup of the decoction is taken orally before breakfast for two to three weeks.
Morus alba L. Chitta toot Moraceae	Fruit	Ascorbic acid, carotene, vitamin D, glutathione, calcium, copper, zinc, boron, manganese, volatile oil, iron, thiamine, nicotinic acid, riboflavin, drying oil, tannins, penta hydroxyflavone, pentahydroxy benzopherene and maclurin (Haq and Hussain, 1993)	Fresh fruits are crushed. One cup of the juice is given to the patient twice a day for two weeks.
Morus nigra L. Kalla toot Moraceae	Fruit	Olcancolic acid, apigenin, cyclocommunol, morusin, cyclomorusin, kuwanon C, daucosterol, ursolic acid, 63-sitosterol (Wang et al., 2007)	Fresh fruits are crushed. One cup of the juice is given to the patient twice a day for two weeks.
Myrsine africana L. Khukan Myrsinaceae	Leaves	Embelin, vilangin methylene bis (2,5-dihydroxy-4-undecyl-3,6-benzoquinone, embolic acid, querctiol (Haq and Rehman, 1990)	Fresh leaves are boiled in water. One cup of the decoction is taken orally twice a day for a week.
Oxalis corniculata L. Gandora Oxalidaceae	Leaves	Glyxylic acid, oxalic acid, vitexin, isovitexin, netural lipids, glycolipids, vitamin c, phaspholipids, fatty acids and tocopherols (Prajapati et al., 2006)	Fresh leaves are crushed and mixed in water. One cup of the juice is given to the patient twice a day for two weeks.
Phyllanthus emblica L. Aamla Euphorbiaceae	Fruit	Alanine, aspartic acid, glumatic acid, lysine, proline, protein, fat, carbohydrates fibers, minerals, iron, niacin, chromium and copper (Prajapati et al., 2006)	Dried fruit of *P. emblica* and seeds of *P. granatum* are grounded together along with sugar. Three teaspoons of the powder are dissolved in one cup of water and taken orally thrice a day for three weeks.
Phyllanthus niruri L. Bahupatra Euphorbiaceae	Roots	Phyllanthine, hypophyllanthine, flavonoids quercetin, astralgin, quercitrin, isoquercitrin, rutine and alkaloids (Prajapati et al., 2006)	Fresh roots are crushed and mixed with water. Half cup of the extract is taken twice a day for 10-15 days.
Pistacia integerrima Stewart ex Brandis Kangar Anacardiacceae	Fruit	Tannins, essential oil, resin, triterpenic acid, pistacienoic acid, triterpene alcohol and triterpenoic acid (Prajapati et al., 2006)	Fresh fruits are crushed and mixed in water. One cup of the extract is given to the patient thrice a day for a weak.
Plantago ovata Forssk. Bhatti Plantaginaceae	Fruit, Seeds	Glycoside, mucilage, tannin, bitter principal, vitamin C, nicotinic acid and fixed oil (Hussein, 1983)	Two teaspoons of fruit or seeds husk are soaked in water for a night. Two cups of this extract are mixed with sugar and taken orally early at morning before breakfast for 20-25 days.
Prunus domestica L. Alubokhara Rosaceae	Fruit	D-glactose, D-mannose, L-arabinose, D-xylose, L-rhamnose, glucuronic acid, flavonoid, kaempferol, dihydrokaempferol, kaempferide and prudomestin (Prajapati et al., 2006)	Dried fruit of *P. domestica* and *T. indica* are soaked in water for a night. One cup of this extract is given to the patient for two to three weeks.

Table 1. Contd.

Punica granatum L. Durni Punicaceae	Fruit, Seeds	Citric acid, sorbitol, mannitol, pelletierine, isoquercetrin, B-sitosterol, friedelin, D-mannitol, estrone, glucose, fructose, sucrose, maltose, oxalic acid and organic acid (Ikram and Hussain, 1978)	Dried fruit of *P. emblica* and seeds of *P. granatum* are grounded together along with sugar. Three teaspoons of the powder are dissolved in one cup of water and taken orally thrice a day for three weeks. Dried rind is grounded and two teaspoons the powder are mixed with sugar and taken orally along with water at morning for a week.
Raphanus sativus L. Mooli Brassicaceae	Root	Raphanin, glycosinolates, enzymes, trace elements, acids, aldehydes, anthocyanin, pectin, proteins and vitamin C (Prajapati et al., 2006)	Fresh roots are cut longitudinally and hanged over a night at open place. These pieces are given to the patient early in the morning for a month.
Rhus chinensis Mill. Taiter Anacardiaceae	Fruit, Root	Gallotannins, gallotannic acid, gallic acid and m- digallic acid (Prajapati et al., 2006)	Dried fruits are grounded along with sugar and three teaspoons of the powder are taken orally with water at morning for three weeks. Fresh roots are boiled in water along with sugar. One cup of the decoction is given to the patient at morning for two to three weeks. Dried fruit and seeds of *R. chinensis, P. granatum* and *F. vulgare* are grounded. Two teaspoons of the powder are taken orally along with water at morning for a month.
Rumex hastatus D. Don, Prodr. Khatimal Polygonaceae	Leaves	Nepalin, nepodin and rumicin (Nadkarni, 1976)	Fresh leaves are crushed along with water and sugar. One cup of this extract is given to the patient twice a day for two weeks.
Saccharum officinarum L. Gana Poaceae	Stem	Abscisic acid, apigenin, glycoside, methyl lapigenin, arabinose, arunodin, benzoic acid, campesterol, coumarin, cylindrin, orientin, fructose, glactose, glucose, phytosterol, saccharans, schaftoside, sucrose, invert sugar, ether, tricin and vicenin (Prajapati et al., 2006)	Fresh stems are crushed. Two cups of the juice are given to the patient four to five times per day for a month.
Silybum marianum L. Gaertn. Ount Katara Asteraceae	Leaves	Flavoligrans, silybin, isosilybin, dehyrosilybin, silydianin, silychristin, silymarine (Foster, 1991)	Fresh leaves are crushed along with water and sugar. Half cup of the Juice is taken orally twice a day for two weeks.
Tamarindus indica L. Imli Caesalpinaceae	Fruit, Roots	Tartaric acid, citric acid, maleic acid, potassium bitartarate, oxalic acid, kerenal, polysaccharides, fkavonoid, glycoside, vetixen, orientin, homoorientin and hordenine (Prajapati et al., 2006)	Roots and fruit of *T. indica* and fruit of *P. domestica* and are soaked in water for a night. One cup of this extract is given to the patient for two to three weeks.
Taraxacum officinale Weber. Hand Asteraceae	Rhizome	Taraxacin, taraxacerine, cerylalcohol, lactuce-roltaraxacin, choline, inulin, tannin, etereal oil, vitamin C, xanthophylls, potassium and vitamin A (Prajapati et al., 2006)	Dried rhizomes are boiled along with sugar. One cup of the decoction is taken orally at morning for two weeks.

Table 1. Contd.

Viola serpens Wall. Phul naqsha Violaceae	Whole plant	Glycoside methyl salicylate, viola quercitrin, alkaloid voiline gum, mucilage, sugar and saponin (Prajapati et al., 2006)	Fresh or dried plant material is first boil in water along with sugar. Two cups of this decoction are taken orally at night for one week.
Woodfordia fruticosa (L) S. Kurz. Dahvi Lythraceae	Flower	Ellagic acid, β. sitosterol, polystachoside, ocatocosauol, myricetin-3-glactoside, cyaniding-3, pelargonidin-3, 5- diglucoside and crrysophanol- 8-0-B-D-glucopyranoside (Prajapati et al., 2006)	Fresh flowers are crushed and mixed with water. One cup of the extract is given to the patient twice a day for two weeks.

juice of *A. roseum* is taken orally for jaundice, while Shinwari and Khan (2000) mentioned that the plant is aphrodisiacs and tonic. Leaf decoction of *Berberis lycium* is used for jaundice in the study areas, while according to several workers (Hussain et al., 2008; Gilani et al., 2006; Shinwari and Gilani, 2003; Matin et al., 2002; Inam et al., 2000; Haq and Rehman, 1990) leaf juice and bark of this plant is used as tonic, cathartic, diuretic, to cure jaundice and dyspepsia. Decoction of fresh plant material of *B. procumbens* is used for the said purpose in the study areas, while other authors (Savithramma et al., 2007; Shah and Khan, 2006; Katewa et al., 2004; Sing et al., 2002; Khan et al., 2000) reported that leaves and roots of this plant are used for jaundice, swelling, watering of eyes, anaemia, asthma, dropsy, gonorrhoea, stomach disorders, sore throat, to relief pain, typhoid, as cooling, antispasmodic and astringent. Juice of *Equisetum debile* is taken orally to cure jaundice, while Inam et al. (2000) reported that same plant is diuretic and used for kidney infection treatment. Leaf decoction of *Carissa opaca* is given to cure jaundice and hepatitis, while Anderson (1988) reported that fruits of this plant are cold and dry. In the study areas, decoction of whole plant of *C. intybus* is used for jaundice and hepatitis but according to others (Ghourbani, 2005; Zafar and Ali, 1998; Haq and Rehman, 1990) roots and stem of this plant are used for asthma, jaundice rheumatism, dermal wounds, typhoid, dropsy and as depurative, stomachic, astringent and cooling.

Paste from whole plant of *cuscuta reflexa* is taken orally to cure jaundice, while other workers (Sajem and Gosai, 2006; Shinwari and Khan, 1998; Haq and Hussain, 1995; Ansari et al, 1993; Haq and Hussain, 1993; Haq and Shah, 1986) mentioned that this plant is used as alterative, anti dandruff, anthelmintic, carminative, toothache, diuretic, purgative, vermifuge, for decoction of *J. adhatoda* is taken for jaundice in the present investigation but according to Ahmed et al. (2007), Savithramma et al. (2007), Muthu et al. (2006), Sajem and Gosai (2006), Shah and Khan (2006) and Haq and Hussain (1993) different parts of this plant are used for cough, asthma, bronchitis, dysentery, vomiting, nose bleeding, cold, fever and skin diseases. Leaf juice of *O. corniculata* is used for jaundice, while according to others (Shah and Khan, 2006; Inam et al., 2000; Shinwari and Khan, 2000; Arshad and Ikram, 1999) this plant is used for stomach trouble, scorpion sting, jaundice, as refrigrent, cooling, antispasmodic and antisorbutic. Dried fruit powder of *P. emblica* is used for said purpose in the study areas, while Ahmed et al. (2007), Savithramma et al. (2007), Muthu et al. (2006), Sing et al. (2002) and Shinwari and Khan (1998) reported that fruit, leaves and bark of this plant are used as eye tonic, astringent, cooling, diuretic, laxative, refrigerant, aperients, for asthma, diarrhoea, dysentery, cold and cholera. Seed husk of *P. ovata* is taken for jaundice, while Shah and Khan (2006), Ahmed et al. (2006), Sultana et al. (2006), Badshah et al. (1996) and Haq and Hussain (1995) reported that leaves and seeds of the plant are used for toothache, diarrhoea, dysentery, ulcer, inflammation, piles and to heal wounds. In the present investigation fruit and roots of *R. chinensis* are used to cure jaundice and hepatitis, while Rai et al. (1992) and Prajapati et al. (2006) reported that fruit of this plant is used to cure dysentery, diarrhoea, vomiting, cough, haemorrhage, as astringent, and is haemostatic, antibacterial, antifungal and antiviral. Leaf extract of *R. hastatus* is taken orally for jaundice and hepatitis, while according to Shah and Khan (2006) and Shinwari and Gilani (2003) roots and leaves of the plant are anthelmintic, tonic, laxative, alterative, purgative, astringent, for sore joints and diarrhoea. Decoction of whole plant of *Viola serpens* is taken orally to cure jaundice and hepatitis, while Ahmed et al. (2006) Shinwari and Khan (2000), Haq and Hussain (1995) and Haq and Rehman (1990) reported that leaves and flowers of this plant are astringent, demulcent, diuretic, diaphoretic, purgative, emollient, refrigerant and purgative.

Conclusion

In the present investigation, 30 medicinal plant species used to treat jaundice and hepatitis were reported and documented. The use of these plants to treat various illnesses is still needed by the communities, because of

poor socio-economic conditions the high cost and a difficult access to allopathic medicines. The majority of the reported species are wild and rare. These demand an urgent attention to conserve such vital resources so as to optimize their use in the primary health care system. Now a day, conservation of traditional knowledge is greatly menaced by a lot of factors related to modernization of the region and lack of interest in traditional healers, in transferring it to next generation. It is, therefore, urgent to save the cultural heritage of the natives, by confirming the therapeutically used plants with scientific criteria. In this context, screening for active substances and testing their activities against jaundice and hepatitis causing organisms form an interesting subject for the feature studies.

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