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## Ethnomedicinal Plants used Against Liver Diseases among the Tribes of India: Review

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**Abstract:** India is known as the botanical garden of the world, has a great history of medicinal plant utilization, traditional plant-based medicines have always been used to treat liver diseases and jaundice. In the present work, we focused on medicinal plants used to treat jaundice and liver diseases. About 124 plant species belonging to about 53 families were found to be used against jaundice or hepatitis by the tribal's and traditional healers. The most important plant species are *Boerhaavia diffusa* and otherspecies, *Centella asiatica*, *Eclipta alba*, *Gentiana tubiflora* and other species, *Lawsonia intermis*, *Luffa acutangula* var. *Amara*, *Polygonum tortuosum*, *Portulaca oleracea*, *Phyllanthusamarus* and other species, *Solanum nigrum*, *Ricinus communis*, *Tephrosia purpurea*, *Thespesia lampas* and *Termenalia* species etc. The ethnomedicinal data are compiled as botanical name, family, local name, native tribe distribution, part of plant, mode of use and references are provided. This review defiantly helps to future scientist in this area.

**Key words:** Jaundice, liver diseases, ethnomedicinal, tribal, traditional healers

### INTRODUCTION

Use of medicinal plants as a source of drugs to cure various diseases is as old as humankind itself. Even to the present day, medicinal plants are available as cheap and accessible source of drug for most of developing and also in developed countries. The WHO has continuously emphasizing the utilization of herbal and traditional drugs. The organization has also estimated that about 80% of the population.

Living in the developing countries relies on traditional medicine for their health care needs (WHO, 2002). Plants not only from the period of immemorial provides as a source of the drug but also till date acting as a source of lead molecules in modern medicine (Potterat and Hostettmann, 1995).

India is known as the botanical garden of the world. Out of the total 4,22,000 flowering plants reported from the world, more than 50,000 are used for medicinal purposes (Govaerts, 2001). In India, more than 43% of the total flowering plants are reported to be of medicinal importance (Pushpangadan, 1995). Utilization of plants for medicinal purposes in India has been documented long back in ancient literature (Charak, 1996).

The identification and documentation of plants of ethnomedicinal importance in many cultures have long been an active area of research and has been connected with various objectives. However, organized studies in

this direction were initiated in 1956 and off late such studies are gaining recognition and popularity due to loss of traditional knowledge and declining plant population (Rao, 1996). Right from its beginning, the documentation of traditional knowledge especially on the medicinal uses of plants, has provided many important drugs of modern day (Cox and Balick, 1994; Fabricant and Farnsworth, 2001; Farnsworth *et al.*, 1985).

Indian forests have long played an integral role in supporting the lives of tribal population, meeting their physical, cultural, spiritual and material needs. Traditional knowledge related to medicinal plants has been percolating verbally for thousands of years. Unfortunately, this type of knowledge has been seriously eroding over the past decades indicating challenges for identification and documentation. Tribal communities possess their own traditional knowledge that contributes to a broader understanding of native plant species, many of which have yet to be studied by "western" scientists.

The liver is the most important organ which regulates many important metabolic functions. Hepatic injury is associated with distortion of these metabolic functions (Wolf, 1999). Liver diseases are mainly caused by toxic chemicals, excess consumption of alcohol, infections and autoimmune disorders. In spite of tremendous advances in modern medicine, there are no effective drugs available that stimulate liver function, offer protection to the liver from damage or help to regenerate hepatic



Fig. 1: Distribution of (%) tribal population in the states of India

cells (Chattopadhyay, 2003; Shanmugasundaram and Venkataraman, 2006). Contrarily, a number of medicinal preparations in traditional medicine of India are recommended for the treatment of liver disorders.

**MATERIALS AND METHODS**

The present study is an attempt to compile the medicinal plants growing and utilizing among the different

tribal culture in India with their mode of use. We reviewed scientific studies published in journals, books, theses and reports. Relevant literature was searched in various electronic databases (NISCAIR, MEDLINE, Science Direct, Scopus, Scirus and Google Scholar) using keywords such as “medicinal plants”, “tribal”, “ethnobotany or ethnopharmacology or Indigenous or Indian” and “survey” (Fig. 1).

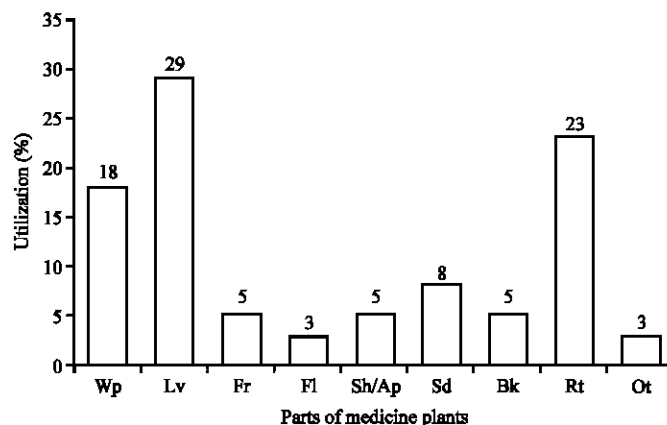


Fig. 2: Plant parts used in treatment of liver disease and jaundice. Lv: leaves; Wp: whole plant; Rt: root; Fr: fruit; Fl: flower; Sh/Ap: Shoots and apex; Bk: bark; Sd: seeds; Ot: other parts

We do not claim to have included all the tribal communities existing information about traditional uses of medicinal plants but we rather chose to focus on information easily accessible to researchers. In the last few decades, it is possible to record the traditional and tribal knowledge related to medicinal plants of different tribal communities. However, in most cases, this information has yet to be made available to the modern world.

We reviewed a total of 37 publications that provided information about the use of medicinal plant species to treat jaundice and liver diseases. We only used publications presenting first-hand ethnobotanical information. A list was produced, showing name(s), part(s) used, use(s), mode of use(s) and reference(s).

In the present study, we focused our review on traditional medicinal practices of tribal communities living in the different Indian forests. The precision of botanical identification in this review depended on that from original sources. Latin names and native status (native vs. introduced) were verified.

## DISCUSSION

The present review is an attempt to compile the traditional ethnobotanical medicinal plants utilized in various parts of India. This study will help to future researchers to understand the correlation between different tribes and their approach to treat liver diseases. In this study, medicinal plants which are being utilized to treat the liver disease among the tribes were focused. Data obtained from present investigation compiled in Table 1 and the medicinal plant species are arranged in alphabetical order. A total of 123 plant species belonging

to 53 families have been reported for the treatment of jaundice and other liver diseases. The most of the medicinal plants are belongs to malvaceae, leguminosae, poaceae, liliaceae, cucurbitaceae, gentianaceae, asteraceae, zingiberaceae, verbenaceae and euphorbiaceae. The botanical name, local name, native tribe utilized, part of plant, mode of use and references are provided. The compilation reveals that the different plant parts were used in the treatment of jaundice and liver diseases. Among these leaves were highly utilized leaves (28%) followed by whole plant (19%), roots (23%), seed (9%) fruit (7%), stem (7%), shoot, bark (5%), other parts such as volatile oils, latex and animal fecal matter and rhizomes (2%) (Fig. 2).

Table 1, shows there are some medicinal plants which were accepted in different tribes as medications for jaundice and liver diseases. They are either used single or in combination or the same part or other parts, includes *Boerhaavia diffusa* and other species, *Centella asiatica*, *Eclipta alba*, *Gentiana tubiflora* and other species, *Lawsonia intermis*, *Luffa acutangula* var. *Amara*, *Polygonum tortuosum*, *Portulaca oleracea*, *Phyllanthusamarus* and other species, *Solanum nigrum*, *Ricinus communis*, *Tephrosia purpurea*, *Thespesia lampas* and *Termenalia* species. These plants are also recommended in Indian system of medicines such as Ayurveda and siddha systems of medicines, these findings indicate these tribes are some or other way relates to these systems. The preparation method of medication sometimes varies from *vaidus* (Medicine man) to *vaidus*. The popular forms are decoction, juice, extract, powder, fresh part and paste. The duration of treatment varies from weeks to months.

Table 1: List of the traditional plant used for jaundice and liver diseases among the tribes of India

Plant name and local name	Locality	Part useful	Aliment	Mode of use	References
<i>Abutilon indicum</i> Don. Sweet (Malvaceae) <i>Thuthi</i>	Local People in Vellore District, Tamil Nadu, India	Leaves	Jaundice, blood dysentery, fever and allergy	Fried leaves are used as a remedy for jaundice, piles, ulcer and leprosy	Thirumalai <i>et al.</i> (2009)
<i>Aconitum rotundifolium</i> Kar. and Kir., (Ranunculaceae) <i>Vashti</i>	Tribal communities of Lahaul-Spiti in western Himalaya	Whole plant and roots	Liver disorder, rheumatism	Juice extracted by crmshing is taken orally with equal volume of water to cure jaundice. About 4-5 g root powder is taken	Singh and Lal (2008)
<i>Aerva lanata</i> (L.) Juss. ex Schult. (Amaranthaceae) <i>Kali-Bui</i>	Shekhawati region of Rajasthan	Roots	Typhoid, pneumonia, jaundice	Root extract is given to the patients of liver congestion and jaundice	Katewa and Galav (2005)
<i>Aegle marmelos</i> Linn. (Rutaceae) Bel	Awati tribes of Nashik Dist	Leaves	Jaundice and piles	Decoction of whole plant is given to cure pneumonia and typhoid	Kalaskar <i>et al.</i> (2012)
<i>Allium tuberosum</i> Roxb. (Liliaceae). Ban lahsun	Amarkantak region, MP	Seeds	Jaundice, kidney problems,	The juice of fresh leaves taken orally	Srivastava <i>et al.</i> (2012)
<i>Aloe barbadensis</i> (Liliaceae) <i>Gawarpaiha</i>	Folklore tribes of Rajasthan	Leaves	Liver diseases	Seeds are utilized to treat liver and kidney diseases	Katewa <i>et al.</i> (2004)
<i>Alterne ulthera purgens</i> Kunth., (Amaranthaceae). Katua Shak	Amarkantak region, MP	Whole plant	Liver and spleen diseases	Whole plant is consumed in liver and spleen disease	Srivastava <i>et al.</i> (2012)
<i>Amomum subulatum</i> (Zingiberaceae) Elaichi	Ethnic and Rural People in Eastern Sikkim	Seeds	Stomachic heart and liver tonic	Seeds are utilized as liver tonic	Das <i>et al.</i> (2012)
<i>Andrographis paniculata</i> (Acanthaceae) <i>Kalmegh</i>	Himalayan Region Sacred Groves	Whole plant, leaves	Liver tonic	Whole plant powder is used to Cures dysentery, worm infection; used as liver tonic	Bhakat and Sen (2008)
<i>Andrographis ovata</i> Benth. (Acanthaceae)	Sinmalai Hills of Eastern Ghats, Tamil Nadu	Leaves	Jaundice, snake bite and scorpion sting	Leaves decoction taken orally with water in jaundice, snake bite and scorpion sting	Alagesaboopathi (2012)
<i>Apluda mutica</i> Linn. (Poaceae) <i>Polada, Bhangta</i>	Sitamata wildlife sanctuary, Rajasthan	Whole plant	Mouth sores of cattle; in liver complaints	Poultice of whole plant	Sikanwar <i>et al.</i> (2008)
<i>Argemone mexicana</i> L. (Papaveraceae) <i>Piwala dhotra</i>	Katepurnawildlife sanctuary of Akoladistrict	Leaves and seeds	Jaundice	Three drops of leaves juice mixed with a cup of cow's milk is taken for three days against jaundice. Seed powder is applied on injury	Rothe (2003)
<i>Asparagus officinalis</i> L. (Liliaceae)	Indian medicinal plants as a source of antimycobacterial agents	Leaves	Jaundice, rheumatism, cardiac disorders	Aqueous extract of leaves utilized in Diuretic, laxative, jaundice, rheumatism, cardiac disorders	Gautam <i>et al.</i> (2007)
<i>Asparagus racemosus</i> (Asparagaceae) <i>Kurilo</i>	Ethnic and Rural People in Eastern Sikkim	Tuberous roots	Diabetes, jaundice, urinary disorder	Tuberous root were utilised for Diabetes, jaundice, urinary disorder	Das <i>et al.</i> (2012)
<i>Averrhoa carambola</i> Linn. (Averrhoaceae) <i>Maabhang</i>	Himalayan Region	Leaves, roots, barks, twing	Jaundice	Decoction of leaves, root, bark and twig is given in jaundice	Sen <i>et al.</i> (2008)
<i>Bauhinia purpurea</i> L. (Leguminosae) <i>Kamini kanchan</i>	Arunachal Pradesh Dibru-Saikhowa Biosphere Reserve of Northeast India	Leaves	Jaundice	The decoctions of leaves are utilized for treatment of jaundice	Purkayastha <i>et al.</i> (2005)
<i>Belamcanda chinensis</i> Linn. (Iridaceae) <i>Tiger lily</i>	Amarkantak region, MP	Root	Liver complaints	Root juice is used to treat liver complaints	Srivastava <i>et al.</i> (2012)

Table 1: Continue

Plant name and local name	Locality	Part useful	Aliment	Mode of use	References
<i>Berberis asiatica</i> Roxb. ex DC. (Berberidaceae) <i>Chunchur</i>	Tribal communities of Chhota Bhangal, Western Himalaya	Roots	Jaundice	The roots are used for curing diabetes and jaundice. Fresh roots are cut into small pieces and decoction is prepared. This is later filtered through a cloth, concentrated and dried in shade. Small pills (each of ca. 1-1.5 g) are made from this. For adults, 3 pills a day are recommended. These pills are consumed with "Kujja Misiri" (local sweet made out of sugar) and water to cure jaundice	Uniyal <i>et al.</i> (2006)
<i>Boerhaavia diffusa</i> L. (Nyctaginaceae) <i>Punarnava</i>	Sacred Groves	Whole plant, leaves	Liver disorders,	Whole plant or leaves powder or decoction were used to cures liver disorders, anemia; used as laxative, diuretic, expectorant	Bhakat and Sen (2008)
<i>Boerhaavia diffusa</i> L. (Nyctaginaceae) <i>Punara, Punarvasu</i>	Tribal's of Western Madhya Pradesh	Root	Jaundice	Root pieces of suitable size are tied in a thread and this is wore as necklace for 1 week	Sanwalsar and Diwarji (2000)
<i>Boerhaavia diffusa</i> Liun. (Nyctaginaceae) <i>Mukiratai</i>	Local People in Vellore District, Tamilnadu, India	Roots	Dyspepsia, jaundice, enlargement of spleen	The decoctions of roots are used for the treatment of dyspepsia, jaundice, enlargement of spleen, abdominal pain and as an antistress agent	Sankaranarayanan <i>et al.</i> (2010)
<i>Boerhaavia diffusa</i> L. (Nyctaginaceae) <i>Satodi</i>	Local communities of Shimoga District of Karnataka, India	Root	Jaundice	Decoction of root was taken orally thrice a day	Mahishi <i>et al.</i> (2005)
<i>Brassica campestris</i> (Brassicaceae)	Indigenous healthcare practices Central Himalayan region of India	Oil	Jaundice	About 50 to 100 g of mustard oil ( <i>Brassica campestris</i> ) is put in a bronze plate 8 to 10 leaves of doob grass ( <i>Cynodon dactylon</i> ) arcimmered in the oil and run over the head of patient again and again by a vaidya (local medicine man) for more than 15-30 min along with some hymns silently chanted once a day	Samal <i>et al.</i> (2004)
<i>Calotropis procera</i> (Ait.) R.Br. (Asclepiadiaceae) <i>Akadi, Akaurwa</i>	Tribal's of Western Madhya Pradesh	Root bark, leaves	Jaundice	One pinch of root bark power mixed with one teaspoon of honey taken orally twice a day for 3-5 days	Sanwalsar and Diwarji (2000)
<i>Careya arborea</i> Roxb. (Lecythidaceae) <i>Haldia kalam, Kumbhi</i>	Tribal's of Western Madhya Pradesh	Stem bark	Jaundice	Bark extract in hot water is used for bath by a lady who has developed jaundice after delivery	Sanwalsar and Diwarji (2000)

Table 1: Continue

Plant name and local name	Locality	Part useful	Aliment	Mode of use	References
<i>Capparis spinosa</i> Linn. (Capparidaceae) <i>Martokpa, Rutoka</i>	The tribal communities of Labraul-Spiti in western Himalaya	Shoots and fruit	Liver disorder, Sexual dysfunction	Green shoots are cut and dried in shade and powdered. The powder is taken orally twice a day to cure liver pain (preliminary stage of jaundice). It also cures irregular urination. About 4-5 ripened fruits are consumed daily as aphrodisiac and cures impotency The fruit infusion is given in jaundice Leaves powder used in jaundice, dysentery Juice of leaves is mixed with equal amount of goat's milk and taken orally for seven days for jaundice Tuberous root used to treat liver diseases Roasted seeds are taken with jaggery to cure jaundice Leaves are used for removing pain and in jaundice. Sap of leaves is used for washing dishes. Leaves extract and paste are used in the treatment of malaria, infected wounds, inflammation and itching skin diseases Leaves are utilized as appetizer, anti-diabetic and jaundice	Singh and Lal (2008)
<i>Cassia fistula</i> L. (Leguminosae) <i>Sonaru</i>	Dibru-Saikhowa Biosphere Reserve of Northeast India	Fruit	Jaundice		Purkayastha <i>et al.</i> (2005)
<i>Centella asiatica</i> L. (Apiaceae) <i>Thankuni</i>	Sacred Groves	Leaves	Jaundice, dysentery		Bhakat and Sen (2008)
<i>Centella asiatica</i> (L.) Urban (Umbelliferae) <i>Valtarai</i>	Madurai District of Tamil Nadu (India)	Leaves	Jaundice		Ignacimuthu <i>et al.</i> (2006)
<i>Chlorophytum borivilianum</i> (Liliaceae) <i>Dholi musadi</i>	Tribal area of Rajasthan, India	Tuberous root	Liver diseases		Katewa <i>et al.</i> (2004)
<i>Cicer arietinum</i> Linn. (Fabaceae), <i>Chana</i>	Bhil tribe of Bibdod, Madhya Pradesh	Seeds	Jaundice		Jadhav (2006)
<i>Clerodendron inerme</i> Gaertn (Verbenaceae), <i>Sangam</i>	Pichavaram mangroves of East coast, Tamil Nadu	Leaves	Jaundice		Ravindran <i>et al.</i> (2005)
<i>Coccinia indica</i> Wight and Arn (Cucurbitaceae)	Malasar tribals in Coimbatore District of Tamil Nadu (South India)	Leaves	Jaundice		Venkataswamy <i>et al.</i> (2010)
<i>Coccinia grandis</i> (L.) J. Voigt (Cucurbitaceae) <i>Kovai</i>	Malasar tribals in Coimbatore District of Tamil Nadu (South India)	Leaves	Jaundice		Venkataswamy <i>et al.</i> (2010)
<i>Cocculus hirsutus</i> (L.) Diels (Menispermaceae), <i>Vasang</i>	Tribal's of Western Madhya Pradesh	Fruit	Jaundice		Samvatsar and Diwanji (2000)
<i>Cordyceps sinensis</i> (Clavicipitaceae) <i>Yarcha gombuk</i>	Ethnic and Rural People in Eastern Sikkim Himalayan Region	Whole plant	Liver tonic, immune-stimulant		Das <i>et al.</i> (2012)
<i>Costus speciosus</i> (Koenig.) Sm. (Zingiberaceae) <i>Jhomlakuti</i>	Dibru-Saikhowa Biosphere Reserve of Northeast India	Rhizome	Jaundice		Purkayastha <i>et al.</i> (2005)
<i>Costus speciosus</i> (Koenig.) Sm. (Zingiberaceae), <i>Jungli Adrak</i>	Tribal's of Western Madhya Pradesh	Roots	Jaundice		Samvatsar and Diwanji (2000)

Table 1: Continue

Plant name and local name	Locality	Part useful	Aliment	Mode of use	References
<i>Cousinia thomsonii</i> C. B. Clarke (Asteraceae) <i>Thuse</i>	The tribal communities of Lahaul-Spiti in western Himalaya	Roots	Jaundice	About 2-2.5 g of root powder is taken regularly	Singh and Lal (2008)
<i>Curculigo orchioides</i> Haern. (Amaryllidaceae) Kalimusli	Tribal's of Western Madhya Pradesh	Tubers	Asthma, jaundice, diarrhea and colic	Tubers are dried, powdered, taken with milk and sugar until it forms thick mucilage	Parveen <i>et al.</i> (2007)
<i>Cuscuta reflexa</i> Roxb. (Convolvulaceae) <i>Amarbel</i> <i>Dalbergia Golubilis</i> Roxb. (Fabaceae) <i>Kamla</i>	Sitamata wildlife sanctuary, Rajasthan Tribals of Western Madhya Pradesh of India	Whole plant Leaves	Jaundice, cholera and Asthma Jaundice	Decoction of whole plant One teaspoon decoction of leaves mixed with one glass of water to be taken orally twice a day for 8 days Paste of whole plant; Root paste	Sikarwar <i>et al.</i> (2008) Samvatsar and Diwanji (2000)
<i>Desmostachya bipinnata</i> Liun. (Poaceae) <i>Kush</i> <i>Desmostachya bipinnata</i> Liun. (Poaceae) <i>Daab/ dabra</i> <i>Eclipta alba</i> Hask. (Compositae)	Sitamata wildlife sanctuary, Rajasthan Grasses of Rajasthan Malasar tribals in Coimbatore District of Tamil Nadu	Whole plant; Roots Roots Leaves,	Dysentery, asthma and jaundice Jaundice Jaundice, Hair tonic	The root paste is useful in asthma and jaundice Leaf juice is used in treatment of jaundice	Sikarwar <i>et al.</i> (2008) Katewa <i>et al.</i> (2001) Venkataswamy <i>et al.</i> (2010)
<i>Eclipta alba</i> (Asteraceae) Bhringaraja	The rural communities of Churu district in the Thar Desert, India Shekhawati region of Rajasthan	Leaves, whole plant	Elephantiasis, Jaundice and fever	The juice is administered in teaspoonful doses	Parveen <i>et al.</i> (2007)
<i>Euphorbia nerifolia</i> Liun. (Euphorbiaceae) <i>Danda-thor</i>	Inhabitants surrounding the Ranthambhore National Park, India	Latex	Coughs, dropsy, colic, jaundice, enlargement of liver, asthma and leprosy	Luke warm latex and common salt is taken with water for curing whooping coughs, dropsy, colic and jaundice, enlargement of liver, asthma and leprosy	Katewa and Galav (2005)
<i>Equus hemionus</i> (Equidae) <i>Gratha</i>		Dung	Jaundice	Dung kept in water and after one day filtered water is given to cure jaundice. The flesh of <i>Streptopelia sp.</i> to attain early puberty and dung of <i>Equus hemionus</i> to cure jaundice has never been reported earlier in India	Mahawar and Jaroli (2006)
<i>Flacourtia indica</i> Burm.f. (Flacourtiaceae) Pulamullu	Tribal people in Theni District (Western Ghats), Southern India Bhotias of Dharchula in Pithoragarh	Leaves Bark	Jaundice Liver problems	Juice extracted from the leaves is taken orally thrice a day for two weeks to treat jaundice Local inhabitant's use iuner bark infusion for the treatment of liver enlargement, jaundice and other liver diseases	Jeyaprakash <i>et al.</i> (2011) Garbyal <i>et al.</i> (2007)
<i>Praxinus micrantha</i> Lingelsheim, (Oleaceae), (Anjo)		Leaves	Jaundice	50 g <i>Munga</i> tender leaves +20 g <i>Bhoozarnika</i> whole plant <i>sharkat</i> is taken in cold water	Sekar and Srivastava (2005)
<i>Ethanomedicinal formulation</i> <i>Moringa oleifera</i> Lam.+ <i>Phyllanthus amarus</i> Schum. and Thonn	Traditional herbal practitioners of Ranchi, Jharkhand	Leaves	Jaundice		



Table 1: Continue

Plant name and local name	Locality	Part useful	Aliment	Mode of use	References
<i>Gentiana leucomelaena</i> Maxim. ex Kuhn (Gentianaceae) <i>Buksuk Shijjo</i>	Pin Valley National Park, Himachal Pradesh	Whole plant	Jaundice	Plants are ground along with boiled water and small portion of petals of <i>Polemonium caeruleum</i> L. ( <i>Aun Ser Mendok</i> ) and <i>Gentianopsis pedunculosa</i> (Hook.) Ma ( <i>Gyatheek</i> ) is added to the above combination. This mixture mixed with boiled cow milk or curd (prepared from Goat's milk) is given empty stomach in the early morning for 15-22 days	Sekar and Srivastava (2005)
<i>Gentiana moorecroftiana</i> Wall. Ex G Don (4622), (Gentianaceae) <i>Santik</i>	Tribal communities of Lahaul-Spiti in western Himalaya	Apex	Liver disorder	Juice extracted by crushing fresh aerial parts is taken in empty stomach to cure jaundice	Singh and Lal (2008)
<i>Gentiana tubiflora</i> (G. Don) Griseb. (Gentianaceae) <i>Chatik</i>	Tribal communities of Lahaul-Spiti in western Himalaya	Apex	Liver disorder	The fresh juice of aerial parts is mixed with equal quantity of water and about half glass of the mixture is taken orally in morning hours to cure jaundice	Singh and Lal (2008)
<i>Gentiana tubiflora</i> (G. Don) Griseb. (Gentianaceae) <i>Tikta curpo mensa</i> (hp)	Pin Valley National Park, Himachal Pradesh	Whole plant	Jaundice	Whole plant is ground with little amount of 'lazi' (salted curd) and made into a paste. This paste is given at night (before going to bed) for 40-45 days	Sekar and Srivastava (2005)
<i>Gentianopsis detonsa</i> (Rottb.) Ma. (Gentianaceae). <i>Tapan</i> (S)	Tribal communities of Lahaul-Spiti in western Himalaya	Whole plant	Liver, Stomach disorder	About one spoon of powder is taken orally with water to cure jaundice and gastric troubles	Singh and Lal (2008)
<i>Gentianopsis detonsa</i> (Rottb.) Ma (Gentianaceae) <i>Chateek</i>	Pin Valley National Park, Himachal Pradesh	Flower	Jaundice	The plant petals along with petals of <i>Polemonium caeruleum</i> L. boiled in water. This mixture boiled in the cow milk or curd of goat milk with <i>Gentian leucomelaena</i> Maxim. is given empty stomach in early morning for 15-22 days	Sekar and Srivastava (2004)
<i>Geum elatum</i> Wallich ex G. Don (Rosaceae) <i>Gyampar mendok, juru silva mensa</i>	Pin Valley National Park, Himachal Pradesh	Whole plant	Jaundice	Extract (2-3 spoonful) mixed with boiled cow milk or curd is given empty stomach for 15-22 days	Sekar and Srivastava (2005)
<i>Haldina cordifolia</i> (Roxb.) Ridsd. (Rubiaceae) <i>Haldu</i> <i>Hae-ke-cho-cha granularis</i> (L.) Kuntze (Poaceae)	Sitamata wildlife sanctuary, Rajasthan Sitamata wildlife sanctuary, Rajasthan	Stem bark, Leaves Whole plant	Deep wounds and Jaundice Enlarged spleen and liver	Paste of stem bark, leaves was used to cure jaundice Whole plant was used in liver diseases	Jain et al. (2005) Jain et al. (2005)

Table 1: Continue

Plant name and local name	Locality	Part useful	Aliment	Mode of use	References
<i>Hippophae rhamnoides</i> Linn., (Elaeagnaceae) <i>Shuag</i>	Tribal communities of Lahaul-Spiti in western Himalaya	Fruit	Sexual dysfunction, Liver disorder	The juice extracted from 5 kg of fruit pulp is boiled at low temperature with half liter of water till it gets solidified. Tablets are made and 2 tablets are given to women with milk to cure excessive bleeding. It is also used to cure jaundice	Singh and Lal (2008)
<i>Hippophae tibetana</i> Schlecht., (Elaeagnaceae) <i>Chhæ-Tuan</i> (S)	Tribal communities of Lahaul-Spiti in western Himalaya	Fruit	Sexual dysfunction, Liver disorder	The dried fruit powder boiled in water to prepare a decoction The decoction obtained is taken to cure jaundice	Singh and Lal (2008)
<i>Ixora acuminata</i> Roxb. (Rubiaceae) <i>Achugoch</i>	Dibru-Saikhowa Biosphere Reserve of Northeast India	Leaves	Jaundice	The leaf Infusion is used in treatment of liver disease	Purkayastha <i>et al.</i> (2005)
<i>Lagenaria siceraria</i> (Mal.) Standley (Cucurbitaceae), Kashiphal	Thar Desert, Rajasthan	Leaves, seeds, roots	Jaundice	A decoction of leaves mixed with sugar is given	Parveen <i>et al.</i> (2007)
<i>Lawsonia inermis</i> Liun. (Lythraceae) <i>Mehandi</i>	Thar Desert, Rajasthan	Leaves	Anemia, edema, jaundice	One gram of fresh leaves and three black peppers are made into paste in 50 mL of cow's milk and it is taken for 1 month	Parveen <i>et al.</i> (2007)
<i>Lawsonia inermis</i> L. (Lythraceae) <i>Manjuti</i>	Similipal biosphere reserve, Orissa, India	Roots	Jaundice	Roots of the plant, leaves juice of <i>Abutilon persicum</i> along with three seeds of pepper and rice given orally to patient twice a day for one week to cure jaundice	Mohanta <i>et al.</i> (2006)
<i>Lawsonia inermis</i> Liun. (Lythraceae) <i>Mehandi</i>	Shekhawati region of Rajasthan	Leaves and seeds	Jaundice, fever and burning maturation	Leaves extract mixed with sugar is given in jaundice. Seeds used in the treatment of fever and burning micturition	Katewa and Galav (2005)
<i>Leucas aspera</i> Spreng (Lamiaceae), Pamiharin	Thar Desert, Rajasthan	Leaves, flowers	Jaundice, fevers, ulcers	The juice of leaves and flowers mixed with milk is given	Parveen <i>et al.</i> (2007)
<i>Luffa acutangula</i> var. <i>amara</i> (Cucurbitaceae), <i>Jurgali turai</i>	Tribes of Rajasthan	Seeds	Stone in urinary bladder	Half tea spoon of powder taken orally with water for 3-4 days	Katewa <i>et al.</i> (2004)
<i>Luffa acutangula</i> (L.) var. <i>amara</i> (Roxb.) Cl. (Cucurbitaceae), <i>Kachwi Turai</i>	Tribals of Western Madhya Pradesh	Leaves or fruit	Jaundice	Two to three drops of leaves or green fruit juice without using water are dropped into one of the nostrils for 4 days	Ignacimuthu <i>et al.</i> (2006)
<i>Mæva indica</i> Wall. (Myrsinaceae) <i>Bogagoch</i>	Dibru-Saikhowa Biosphere Reserve of Northeast India	Roots	Jaundice	The ash Infusion was used in jaundice	Purkayastha <i>et al.</i> (2005)
<i>Morinda coreia</i> Buch. - Ham., (Rubiaceae) <i>Aakli</i>	Tribals of Western Madhya Pradesh	Roots	Jaundice	5 g of fresh or dry root ground with half cup of cold milk or water This dose is given orally twice a day for 2-3 days	Samvatsar and Diwanji (2000)
<i>Morandina tenaxissima</i> Roxb. (Asclepiadaceae), <i>Chanabur</i>	Tribal communities of Chitrakoot, Madhya Pradesh	Tuber, root	Joints pain, jaundice	Root juice is given in jaundice twice a day for seven days	Sikarwar <i>et al.</i> (2008)
<i>Nelumbo nucifera</i> Gaertn. (Nymphaeaceae) Padma	Traditional healers of south Orissa	Flower	Cardiotonic, fever and liver ailments	Young flower paste is prescribed as cardiotoxic and in liver ailments	Panda and Mishra (2011)

Table 1: Continue

Plant name and local name	Locality	Part useful	Aliment	Mode of use	References
<i>Oberonia ensiformis</i> Lindl. (Orchidaceae) <i>Podhu</i>	Khonds of Visakhapatnam district andhra Pradesh	Roots	Jaundice	Jaundice; root, tuber and leaves are used in preparing a paste which is swallowed. It also improves RBC count of blood and provides fairer skin	Rao <i>et al.</i> (2006)
<i>Ocimum basilicum</i> L. (Lamiaceae) <i>Mirkuta</i>	Korku tribe of Amravati district of Maharashtra, India	Seeds	Jaundice	Seeds crushed in water and half a cup taken twice a day for 7 days to cure jaundice	Jagtap <i>et al.</i> (2006)
<i>Oroxylum indicum</i> L. Kurz (Bignoniaceae) <i>Phen plena</i>	Similipal biosphere reserve, Orissa, India	Leaves	Jaundice	50 mL leaves juice prescribed to be taken orally thrice a day for three to four days to cure jaundice	Mohanta <i>et al.</i> (2006)
<i>Oryza sativa</i> L. (Poaceae). <i>Aludhan</i>	Dibru-Saikhowa Biosphere Reserve of Northeast India	Straw	Jaundice	The ash infusion was used in jaundice	Purkayastha <i>et al.</i> (2005)
<i>Pandanus amaryllifolius</i> (Pandanaceae) <i>Thazhham poo</i>	Local People in Vellore District, Tamilnadu, India	Tender shoots	Jaundice	Tender shoots are directly eaten in the case of severe jaundice	Sankaranarayanan <i>et al.</i> (2010)
<i>Peganum harmala</i> (Zygophyllaceae). <i>Harmal</i>	Churu district in the Thar Desert, India	Seeds	Asthma, colic and jaundice	The powder of seeds is a good anodyne and the watery infusion is similarly useful	Parveen <i>et al.</i> (2007)
<i>Picris hieracioides</i> L. Kaimaensis Kitam (Asteraceae) <i>Cherakpa</i>	Pin Valley National Park, Himachal Pradesh	Whole plant	Jaundice	Plant extract mixed with lazi (salted curd) is given in the early morning and late night for 20-30 days	Sekar and Srivastava (2005)
<i>Plantago major</i> L. (Plantaginaceae) <i>Boulpho</i>	Dibru-Saikhowa Biosphere Reserve of Northeast India	Leaves	Jaundice	The leaves are powdered and It is taken in the form of Pill	Purkayastha <i>et al.</i> (2005)
<i>Porana paniculata</i> Roxb. (Convolvulaceae) <i>Ln. Hirohiravala</i>	Tribals of southern Rajasthan	Leaves and bark	Jaundice	Half cup leaves and bark extract is given to women and newly born child suffering from jaundice just after delivery for 3-7 days twice a day	Jain <i>et al.</i> (2005)
<i>Polygonum tortuosum</i> D. Don (Polygonaceae) <i>Agei Davji</i>	Pin Valley National Park, Himachal Pradesh	Whole plant	Jaundice	Whole plant paste mixed with curd (prepared from Goat's milk) is given empty stomach for 15-22 day	Sekar and Srivastava (2005)
<i>Polygonum tortuosum</i> D. Don. (Polygonaceae) <i>Nyalo</i>	Tribal communities of Lahaul-Spiti in western Himalaya	Apex	Liver, Stomach disorder	Powder obtained from aerial parts is consumed orally with water to cure jaundice and stomach pain	Singh and Lal, (2008)
<i>Plumbago zeylanica</i> L. (Plumbaginaceae) <i>Chitramula (White leafwort)</i>	Villages in Shimoga District of Karnataka, India,	Root	Jaundice	Roots, gum of <i>Acacia concinna</i> DC.a (Saptala) cardamom seeds, dates, coconut fruit pulp and sugar mixed well and taken orally for 9 days. Root paste prepared with lime juice applied on to the body for 3-5 days	Mahishi <i>et al.</i> (2005)
<i>Portulaca oleracea</i> L. (Portulacaceae) <i>Lunkia</i>	Shekhawati region of Rajasthan	Leaves	Liver diseases	The plant is refrigerant and effective in scurvy and liver diseases	Katewa and Galav (2005)

Table 1: Continue

Plant name and local name	Locality	Part useful	Aliment	Mode of use	References
<i>Portulaca oleracea</i> L. (Portulacaceae)	Dibm-Saikhowa Biosphere Reserve of Northeast India	Roots	Jaundice	It is used in the form of Infusion to treat Jaundice	Purkayastha <i>et al.</i> (2005)
<i>Mabihugkutura</i> <i>Phyllanthus amarus</i> , Schum. and Thonn. (Euphorbiaceae) <i>Kizhaneli</i>	Malasar tribals in Coimbatore District of Tamil Nadu (South India)	Leaves	Jaundice	Leaves juice is administered to cure fever and jaundice	Thirumalai <i>et al.</i> (2009)
<i>Phyllanthus amarus</i> Schum. and Thonn. (Euphorbiaceae) <i>Keezhaneli</i>	Traditional healers in Kancheepuram District of Tamil Nadu, India	Leaves	Jaundice	Fresh leaves are ground and mixed with a cup of cow or goat's milk and taken internally to cure jaundice	Muthu <i>et al.</i> (2006)
<i>Phyllanthus amarus</i> Schum. and Thonn (Euphorbiaceae)	Sitamata wildlife sanctuary, Rajasthan	Leaves, root	Syphilis, Gonorrhoea, Jaundice	Leaves paste and decoction of leaves	Jain <i>et al.</i> (2005)
<i>Phyllanthus amarus</i> Schum. et Thonn (Euphorbiaceae)	Villages in Shimoga District of Karnataka, India,	Leaves	Jaundice	Fresh root	Mahishi <i>et al.</i> (2005)
<i>Nela neli</i> ( <i>Bhunyamanalaki</i> ) <i>Phyllanthus fraternus</i> Webster (Euphorbiaceae)	Tribals of Western Madhya Pradesh of India	Whole plant, roots	Jaundice	Leaves paste with cardamom taken internally, two tea Spoons daily	Samvatsar and Diwanji (2000)
<i>Phyllanthus virgatus</i> G. Forst. (Euphorbiaceae) <i>Kuthu keelanelli</i>	Kani tribals in Kouthalai of Timmelveli hills, Tamil Nadu, India	Leaves	Jaundice	One plant ground without water and made into a tablet. One tablet a day for 3 days to be taken orally	Ignacimuthu <i>et al.</i> (2006)
<i>Saccharum officinarum</i> L. (Poaceae) <i>Ganna, Sonia</i>	Tribals of Western Madhya Pradesh of India	Stem	Jaundice	Root paste with water given internally on empty stomach for 3 days	Samvatsar and Diwanji (2000)
<i>Solanum nigrum</i> Liun (Solanaceae) <i>Makzy</i> <i>Solanum nigrum</i> Liun (Solanaceae). <i>Kakanaxhi</i> <i>Sonchus oleraceus</i> L. (Asteraceae) <i>Anbhali</i>	Sitamata wildlife sanctuary, Rajasthan Sacred Groves Shekhawati region of Rajasthan	Whole plant, Root, fruits Whole plant Whole plant	Liver complaints, Blood Purifier Used in liver and skin diseases, dysentery, piles Liver and Cirrhosis	Paste of leaves is taken along with the leaves of <i>Ricinus communis</i> , <i>Centella asiatica</i> and <i>Calamus rotang</i> to cure jaundice	Jain <i>et al.</i> (2005)
<i>Raphanus sativus</i> (Brassicaceae) <i>Muli</i>	Indigenous healthcare practices, Central Himalayan region of India	Leaves	Jaundice	Four to six internodes to be eaten on empty stomach in the morning followed by 500 ml milk for 4-5 days	Bhakat and Sen (2008)
<i>Ricinus communis</i> L. (Euphorbiaceae) <i>Arandi</i>	Tribals of Western Madhya Pradesh of India	Leaves	Jaundice	One glass of stem juice is advisable Juice of whole plant, root extract, fruits eaten in liver complaints Powder of the whole plant is used Extract mixed with sugar is taken orally to cure liver disease, particularly enlarged liver and cirrhosis	Katewa and Galav (2005)
				Fresh and young leaves of radish ( <i>Raphanus sativus</i> ) are eaten raw, cooked green leaves are also consumed	Samal <i>et al.</i> (2004)
				Leaves ground with equal quantity of jaggery and made into small tablets like grain of maize. Two tablets three times a day for 3 days to be given orally (for adults) and two tablets for two times a day for 3 days for children	Samvatsar and Diwanji (2000)

Table 1: Continue

Plant name and local name	Locality	Part useful	Aliment	Mode of use	References
<i>Ricinus communis</i> L. (Euphorbiaceae) <i>Erendi</i>	Awati tribes of Nashuk Dist	Leaves	Jaundice	Fresh leaves juice taken along with cow milk in morning	Kalaskar <i>et al.</i> (2012)
<i>Rubus foliolosus</i> D. Don (Rosaceae) <i>Kala Hansyali</i>	<i>Bhojias</i> of Dharchhula in Pithoragarh	Roots	Liver diseases	Root of <i>Rubus foliolosus</i> D. Don (Kala Hansyali) mixed with inner bark infusion is taken for the treatment of liver ailments	Garbhal <i>et al.</i> (2007)
<i>Sterculia urens</i> Roxb. (Sterculiaceae) Kullu, Katera gond	Amarkantak region, MP	Bark	Liver and skin diseases	Bark is utilized to treat liver and skin diseases	Srivastava <i>et al.</i> (2012)
<i>Sweritia chirayita</i> (Gentianaceae) Bhuinimba	Pottangi, Koraput District, Odisha	Whole plant	liver disorders	It is useful in liver disorders, eyes, heart, nausea, fevers, indigestion and bloating, malaria	Dhal <i>et al.</i> (2011)
<i>Tamarindus indica</i> L. (Fabaceae/ leguminosae). <i>Imali, Amali</i>	Sitamata wildlife sanctuary, Rajasthan	Seeds, Fruits	Antidote; blood purifier and in jaundice	Seed paste extract of fruit	Jain <i>et al.</i> (2005)
<i>Taraxacum officinale</i> Weber ex Wiggers (Asteraceae) <i>Karp/hool</i> (H)	Aromatic plants of Himachal Pradesh, India	Roots	Liver complaints, Snake bite	The roots are used in kidney and liver complaints. The whole plant is crushed into a paste and given orally in snakebites and paste is also applied externally on wound	Sharma and Lal (2005)
<i>Terminalia arjuna</i> (Roxb. ex DC.) Wt. and Arn. (Combretaceae) <i>Arjun, Lohgal, Ragat-Rora</i>	Tribals of Western Madhya Pradesh of India	Stem bark	Jaundice	Aqueous extract of the bark is given for 3 days in the morning on empty stomach	Samvatsar and Diwanji (2000)
<i>Terminalia belirica</i> (Gaertn.) Roxb. (Combretaceae). <i>Bahara</i>	Sitamata wildlife sanctuary, Rajasthan	Fruit	Liver complaints	Powder of fruit	Jain <i>et al.</i> (2005)
<i>Tephrosia purpurea</i> (Linn.) Pers. (Fabaceae/Leguminosae) <i>Jhejiru</i>	Sitamata wildlife sanctuary, Rajasthan, India	Whole plant, root and leaves	Enlarged liver, Impotency	Decoction of whole plant, root powder and root juice, leaves juice	Jain <i>et al.</i> (2005)
<i>Tephrosia purpurea</i> (L.) Pers. (Fabaceae) <i>Dhamaso</i>	Shekhawati region of Rajasthan	Root	Dyspepsia, enlarged liver, impotency and snakebite	Root powder along with black pepper is taken orally to cure dyspepsia, enlarged liver, impotency and snakebite	Katewa and Galav (2005)
<i>Tephrosia purpurea</i> (Linn.) Pers. (Fabaceae) <i>Kohunchi</i>	Traditional users in Villupuram district of Tamil Nadu	Whole plant		The whole plant has been claimed to cure diseases of kidney, liver, spleen, heart and blood	Sankaranarayanan <i>et al.</i> (2010)
<i>Thespesia populanea</i> Cav. (Ranunculaceae) <i>Poovarasan</i> Ranunculaceae	Traditional users in Villupuram district of Tamil Nadu	Bark	Skin, liver diseases, urethritis and gonorrhea	The decoction of the bark is commonly used for the treatment of skin and liver diseases. Oil of the bark mixed with vegetable oil is useful in urethritis and gonorrhea	Sankaranarayanan <i>et al.</i> (2010)
<i>Thespesia lampas</i> (Cav.) Dalz. and Gibbs (Ranunculaceae) <i>Chakumukhia, Pani kapas</i>	Tribal communities of Chitrakoot, Madhya Pradesh	Root	Jaundice	The root paste is given twice a day for 7 days in jaundice	Sikarwar <i>et al.</i> (2008)
<i>Thespesia lampas</i> (Cav.) Dalz. and Gibbs. (Ranunculaceae) <i>Jangli kapas</i>	Korku tribe of Anravati district of Maharashtra, India	Roots	Jaundice	Mixture (20 g) of root powder with root powder of <i>Cochlospermum religiosum</i> and <i>Phoenix sylvestris</i> taken with a glass of water thrice a day for 2 months to cure jaundice	Jagtap <i>et al.</i> (2006)

Table 1: Continue

Plant name and local name	Locality	Part useful	Aliment	Mode of use	References
<i>Tylophora asthmatica</i> Wight et Arn (Verbenaceae) <i>Pitta mazari</i> (Indian <i>ipecacuanha</i> )	Local communities in some villages in Shimoga District of Karnataka, India	Root	Jaundice	Roots with black pepper ( <i>Piper nigrum</i> L.) garlic and fruits of <i>Syzygium cumini</i> Lam. made into paste, taken orally for 2-3 days Stem juice is valued in high fever and given in jaundice either alone or mixed with honey Decoction of whole plant	Mahishi <i>et al.</i> (2005)
<i>Thiospora cardifolia</i> Willd., (Menispermaceae) <i>eem giloy</i>	Rural communities of Churu district in the Thar Desert, India	Whole plant, stem	Jaundice and fever		Parveen <i>et al.</i> (2007)
<i>Vanda tessellata</i> Roxb. (Orchidaceae) <i>Hatjoor</i>	Sitamata wildlife sanctuary, Rajasthan, India	Whole plant	Acne, jaundice and Dropsy		Jain <i>et al.</i> (2005)
<i>Vigna marina</i> Burm. (Fabaceae)	Indian medicinal plants	Apex	Jaundice	Scientifically the petroleum ether extract shown potent hepato-protection The infusion is commonly utilized to treat Jaundice	Gautam <i>et al.</i> (2007)
<i>Vitex negundo</i> L. (Verbenaceae) <i>Pachatia</i>	Dibru-Saikhowa Biosphere Reserve of Northeast India	Leaves	Jaundice		Purkayastha <i>et al.</i> (2005)
<i>Woodfordia fruticosa</i> (Lythraceae) Dhayero	Ethnic and Rural People in Eastern Sikkim Himalayan Region	Flower	Piles, Liver complaints and Gastric trouble	Dried flowers for piles, liver complaints Bark for gastric trouble	Das <i>et al.</i> (2012)
<i>Zanthoxylum hamiltonii</i> Wall. (Rutaceae) <i>Tezmoi</i>	Dibru-Saikhowa Biosphere Reserve of Northeast India	Tender stem roots	Bleeding gum, Jaundice	Tender shoots and roots are utilized for jaundice	Purkayastha <i>et al.</i> (2005)
<i>Zingiber officinale</i> , Roscoe. (Zingiberaceae) Zingiberaceae	Traditional users in Villupuram district of Tamil Nadu	Fresh juice of rhizome	Liver diseases	The fresh juice taken from ginger is internally useful in the case of indigestion and liver diseases	Sankaranarayanan <i>et al.</i> (2010)
<i>Ziziphus jujuba</i> Mill. syn. <i>Z. sativa</i> Gaertn. (Rhamnaceae) <i>Spgi</i>	Uri, Kashmir Himalaya	Seeds	Jaundice	Decoction prepared by grinding the seeds in salty water is taken orally, with a dosage of two spoons thrice a day, for two months duration, to recover from jaundice	Khan <i>et al.</i> (2004)

## CONCLUSION

A significant contribution to human health are provided by medicinal plants of the locality and one of the most significant ways in which humans directly reap the benefits provided by biodiversity. India has a long history of medicinal plant utilization in traditional and tribal culture. Here we reported on 124 medicinal plant species Used in the traditional health care systems of tribal people from the India. This is the most comprehensive review to date and it shows striking similarities between medicinal plant uses in nations. Thus, by triangulation, it is probably still possible to document most of the knowledge but research should continue, especially in areas or within nations that have received less attention.

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