

## FOLK MEDICINE FOR YAKRIT VIKARA (LIVER DISORDER) - A SCIENTIFIC REVIEW

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### ABSTRACT

Folk medicine still plays an important role in communities throughout India. It combines the organic and the spiritual healing tradition that seeks to maintain both personal and community harmony and equilibrium. Folk medicine is remembered, conserved and passed down by word of mouth, demonstration and repetition from one generation to the next. Only rarely this information are recorded or written down. Modern medical facilities are expensive and out of reach for many, especially those living in the rural areas. But the rural and tribal communities have always relied on traditional knowledge and medicines developed and transmitted from generation to generation. These communities have a store house of knowledge about their geographical flora and fauna and they know how to treat common ailments. Many formulations containing herbal extracts are available in the market for liver disorders. But management of liver disorders by a simple and precise herbal drug is still a captivating crisis. Hence, there is an ever increasing need for safe hepato-protective herbal agent. In the present study scientific analysis was done on numbers of folk medicine used by various tribal communities for liver disorder throughout India. As a consequence the study may provide the additional information regarding various kinds of traditional treatment modalities for liver disorder and also the scope for further scientific research.

**Keywords:** Folk medicine, Liver disease, Ayurveda, Herbal

### INTRODUCTION

Medicinal plants have been used in India since the time immemorial for curing diseases of man and his domestic animals. To a certain extent of period the use of medicinal plants for curing disease was a family profession. The well-known, unrecorded knowledge about medicinal herbs used to be passed from generation to generation in the family. Hence from time to time due to absence of concerned inheritor, the entire information about such healing knowledge was lost<sup>1</sup>. Even the written science of Ayurveda suffers from a serious lack of characterization of the medicinal

herbs. Hence at this time it becomes obligatory to protect such kind of traditional and National heritage of healing knowledge through documentation. Also detailed investigation and documentation of plants used in local health traditions and pharmacological evaluation of these plants and their taxonomical relatives can lead to the development of invaluable plant drugs for many dreaded diseases<sup>2</sup>. As per WHO, about three quarters of the world's population currently use herbs and other traditional medicines to cure various diseases, including liver disorders. Several phy-

tomedicines (medicinal plants or herbal drugs) are now used for the prevention and treatment of liver disorders<sup>3</sup>.

Liver is one of the busiest organs of body. Liver has a pivotal role in regulation of physiological processes. From manufacturing of bile for digestion to eliminating toxins from the body, the liver performs more than 500 different functions<sup>4</sup>. Furthermore, detoxification of a variety of drugs and xenobiotics occurs in liver. The bile secreted by the liver has an important role in digestion. Unfortunately, with modern-day lifestyle (increased junk food consumption, heavy drinking, incessant smoking, skyrocketing stress levels and self-medication), liver diseases are emerging rapidly<sup>5</sup>. Liver diseases can be classified as acute or chronic hepatitis (inflammatory liver diseases), hepatosis (non-inflammatory diseases) and cirrhosis (degenerative disorder resulting in fibrosis of the liver). Liver diseases are mainly caused by toxic chemicals (certain antibiotics, chemotherapeutics, peroxidised oil, aflatoxin, carbon-tetrachloride, chlorinated hydrocarbons etc.), excess consumption of alcohol, infections and autoimmune disorder. Most of the hepatotoxic chemicals damage liver cells mainly by inducing lipid peroxidation and other oxidative damages<sup>6-10</sup>. Enhanced lipid peroxidation produced during the liver microsomal metabolism of ethanol may result in hepatitis and cirrhosis<sup>11-13</sup>. Herbal drugs have gained importance and

popularity in recent years because of their safety, efficacy and cost effectiveness. In spite of tremendous strides in modern medicine, there are hardly any drugs that stimulate liver function, offer protection to the liver from damage or help regeneration of hepatic cell. Many formulations containing herbal extracts are sold in the Indian market for liver disorders. But management of liver disorders by a simple and precise herbal drug is still an intriguing problem. Hence, there is an ever increasing need for safe hepatoprotective herbal agent<sup>14</sup>. Several Indian medicinal plants have been extensively used in the Indian traditional system of medicine for the management of liver disorder. Some of these plants have already been reported as strong antioxidant agent. Keeping all these facts on the background present study was undertaken to document the folk practices available for liver disorder. All related books; Journal and internet data were analyzed. Study showed some of these practices are scientifically proved and some are yet to be proved.

**METHODOLOGY AND RESULT:** Related books, Journal and internet resources were used for data collection. The folk remedies commonly used by the various communities for liver disorder were documented along with available scientific data of related use.

**Table-1, Folk medicine for liver disorder used by the various tribal communities:**

Sl no.	Name of the plant	Local or Ayurvedic Name	Traditional uses	Scientific analysis
1.	<i>Acacia cat-echu</i> (L.f.) Willd. (Mimosaceae)	<i>Khadira</i> (Ay)	Heart wood decoction used for liver disorder <sup>1</sup> .	Ethyl acetate extract exhibited significant hepatoprotective activity <sup>52</sup> .
2.	<i>Abrus precatorius</i>	<i>Gunja</i> (Ay)	Decoction of plant	Hydroalcoholic extract possesses significant hepatoprotective activity <sup>53</sup> .

L.(Fabaceae)		taken orally for hepatitis <sup>51</sup> .	
3. <i>Acacia leucophloea</i> (Roxb.) Willd. (Mimosaceae)	<i>Kadara</i> (Ay)	One teaspoonful root-powder is taken with a cup of water to cure jaundice <sup>46</sup> .	Hydro alcoholic extract showed significant hepatoprotective activity <sup>54</sup> .
4. <i>Achyranthes aspera</i> (Amaranthaceae)	<i>Apamarga</i> (Ay)	Powder from dried seeds with some sugar crystals is dissolved in water and given twice daily to cure jaundice <sup>15</sup> .	Methanol extract from aerial parts of plant exhibited significant hepatoprotective effect <sup>55</sup> .
5. <i>Aegle marmelos</i> (L.) corraea. (Rutaceae)	<i>Vilva</i> (Ay)	Pulp of unripe fruit is mixed with pickled mango ( <i>Mangifera indica</i> L.) and lemon ( <i>Citrus aruntifolia</i> S.W) given orally for jaundice <sup>15</sup> .	Aqueous extracts of <i>Vilva</i> fruits pulp and seeds are effective in the treatment and prevention of CCl <sub>4</sub> -induced hepatic cytotoxicity <sup>56</sup> .
6. <i>Aloe barbadensis</i> Mill. (Liliaceae)	<i>Kumari</i> (Ay)	<i>Kumari</i> pulp mixed with zinger and black salt used for liver disorder <sup>16</sup> .	Aqueous extract of <i>Aloe barbadensis</i> is significantly capable of restoring integrity of hepatocytes <sup>57</sup> .
7. <i>Andrographis echiioides</i> (L.) Nees (Acanthaceae)	<i>Dontaralaku</i> (AP)	Whole plant decoction used to cure Liver disease <sup>17</sup> .	No studies are available regarding this use.
8. <i>Andrographis paniculata</i> (Burm.f.) Nees (Acanthaceae)	<i>Bhunimba</i> (Ay)	Leaf or root decoction filtered and administered for	Aqueous leaf extract showed significant hepatoprotective effects <sup>58</sup> .

			liver disorder <sup>17</sup> .
<b>9.</b>	<i>Apium graveolens</i> L. (Apiaceae)	<i>Ajamoda</i> (Ay)	Seeds of <i>A. graveolens</i> used for the treatment of liver and spleen disorders, jaundice <sup>18</sup> .
<b>10.</b>	<i>Argemone Mexicana</i> L. (Papaveraceae)	<i>Svarnakshiri</i> (Ay)	Decoction of the leaves is taken internally to cure Hepatitis <sup>51</sup> .
<b>11.</b>	<i>Asparagus racemosus</i> Willd. (Liliaceae)	<i>Shatavari</i> (Ay)	Root extract mixed with milk after boiling it, one spoonful of this consumed with honey per day to cure jaundice <sup>15</sup> .
<b>12.</b>	<i>Bacopa monnieri</i> (L.) Wettst. (Scrophularaceae)	<i>Brahmi</i> (Ay)	Whole plant is used for the treatment of jaundice, liver diseases, spleen disorders, and digestive problems <sup>19, 20</sup> .
<b>13.</b>	<i>Balanites aegyptiaca</i> (L.) Delile (Zygophyllaceae)	<i>Ingudi</i> (Ay)	The bark, unripe fruits, and leaves of the <i>B. aegyptiaca</i> are used in folk medicine for the treatment of jaundice, liver disorder.

		ders <sup>21</sup> .	
<b>14.</b> <i>Benincasa hispida</i> (Thunb.) Cogn.	<i>Kushmanda</i> ( Ay)	Water boiled fruit extract is taken orally for curing hepatitis <sup>51</sup> .	The hepatoprotective action of aqueous extract has reported <sup>64</sup> .
<b>15.</b> <i>Beta vulgaris</i> L. (Chenopodiaceae)	Beet root	Root used in traditional medicine for a wide range of diseases including spleen and liver problems and inflammatory disorders <sup>22,23</sup> .	Ethanollic extract of root showed hepatoprotective action against CCl <sub>4</sub> -induced hepatic damage in rats <sup>65</sup> .
<b>16.</b> <i>Boerhavia diffusa</i> L. (Nyctaginaceae)	<i>Punarnava</i> (Ay)	Root paste mixed with water used in Liver diseases. About one cup of decoction of leaves is given twice a day to cure Jaundice till cure <sup>15</sup> .	Alcoholic extract of whole plant exhibited hepatoprotective activity against CCl <sub>4</sub> hepatotoxicity in rats and mice <sup>66</sup> .
<b>17.</b> <i>Bridelia stipularis</i> (L.) Blume (Euphorbiaceae)	<i>Leikongron</i> (Manipuri)	Leaf juice is applied internally to cure hepatitis <sup>51</sup> .	No scientific data available regarding this use.
<b>18.</b> <i>Cajanus cajan</i> (L.) Millsp. (Fabaceae)	<i>Kesari</i>	Leaf extract is taken as raw internally against hepatitis <sup>51</sup> .	Hydroalcoholic extract of the aerial part of plant exhibited hepatoprotective action <sup>67</sup> .
<b>19.</b> <i>Camellia sinensis</i> (L.) Kuntze (Theaceae)	<i>Shyamaparni</i> (Ay)	<i>Camellia sinensis</i> Linn. is the second most commonly used herb	Aqueous extract of leaves protects the liver from carbon-tetrachloride-induced damage <sup>68</sup> .

		by Saudi population for liver problems <sup>24</sup> .	
20.	<i>Canavalia gladiata</i> (Jacq.) DC. (Fabaceae)	<i>Adavithamba</i> (AP)	Root paste (20 gm) given along with rice gravel for 2 to 3 days to cure enlargement of liver <sup>17</sup> . Root extract protects the liver from severe damage caused by D-GalN <sup>69</sup> .
21.	<i>Carica papaya</i> L. (Caricaceae)	<i>Papita</i> (Ay)	Ripe fruits are prescribed for Hepatitis <sup>51</sup> . Ethanol and aqueous extracts of fruit showed hepatoprotective effect <sup>70</sup> .
22.	<i>Chassalia curviflora</i> (Wall.) Thwaites (Rubiaceae)	<i>Vanya sarpakshi</i> (Ay)	Root is used to cure jaundice by Kani tribes of Kerala <sup>45</sup> . No studies are available regarding this use.
23.	<i>Citrus aurantifolia</i> (Christm.) Swingle (Rutaceae)	<i>Nimbuka</i> (Ay)	Juice of one fruit mixed with sugar, in a glass of water and consumed thrice a day to cure jaundice <sup>15</sup> . Fruit extract proved as hepatoprotective agent against Aflatoxin B1 induced hepatotoxicity
24.	<i>Clitoria ternatea</i> L. (Fabaceae)	<i>Aparajita</i> (Ay)	The leaves, seeds, and flowers are used in traditional medicine for liver diseases <sup>25</sup> . Recent study proved the hepatoprotective effect of leaf extract <sup>71</sup> .
25.	<i>Curcuma longa</i> L. (Zingiberaceae)	<i>Haridra</i> (Ay)	It has been widely used in Asian traditional medicine for loss of appetite, jaundice, liver problems and gall bladder disorders <sup>26</sup> . Ethanol extract showed Hepatoprotective effect against thioacetamide induced liver cirrhosis in rats <sup>72</sup> .

<p><b>26.</b> <i>Cuscuta re- flexa</i> Roxb. (Cuscutaceae)</p>	<p><i>Amarvel</i> (Ay)</p>	<p>Decoction of whole plant is taken internally for Hepatitis<sup>51</sup>.</p>	<p>Ethanol extract of whole plant proved as hepatoprotective drug<sup>73</sup>.</p>
<p><b>27.</b> <i>Dracaena terniflora</i> Roxb. (Agavaceae)</p>	<p><i>Manjakantha</i></p>	<p>Root used for jaundice<sup>46</sup>.</p>	<p>No studies are available regarding this use.</p>
<p><b>28.</b> <i>Eclipta alba</i> (L.) Hassk. (Asteraceae)</p>	<p><i>Bhringaraja</i> (Ay)</p>	<p>Leaf juice mixed in jaggery and 40 gm powder of <i>Piper nigrum</i>, advised to consume with spoonful honey two times daily<sup>15</sup>.</p>	<p>As a single drug is already proved as hepato protective but no study is available regarding this formulation as hepatoprotective.</p>
<p><b>29.</b> <i>Ensete super- bum</i> (Roxb.) Cheesman (Musaceae).</p>	<p><i>Kamakshi</i> (Ay)</p>	<p>3 gm of seeds of <i>Brassica juncea</i> (L.) crushed in fruit and consumed a week to cure Jaundice<sup>15</sup>.</p>	<p>No study is available on this formulation</p>
<p><b>30.</b> <i>Euphorbia nerifolia</i> L (Euphorbiaceae)</p>	<p><i>Snuhi</i> (Ay)</p>	<p>Two drops of latex with jaggery is taken at morning only for few days<sup>15</sup>.</p>	<p>Plants having hepatoprotective action but with Jaggery yet to be analyse.</p>
<p><b>31.</b> <i>Ficus carica</i> L. (Moraceae)</p>	<p><i>Falgu</i> (Ay)</p>	<p>The plant has been widely used for the treatment of liver diseases<sup>28, 29</sup>.</p>	<p>Leaves and fruits are already proved as hepatoprotective agent.</p>
<p><b>32.</b> <i>Gardenia resinifera</i> Roth. (Rubiaceae)</p>	<p><i>Dikamali</i> (Ay)</p>	<p>A spoonful of powder (Gum exudates)</p>	<p>Study not available</p>

			mixed in sugar and consumed daily till cure hepatic disorders <sup>15</sup> .	
33.	<i>Garcinia p- dunculata</i> Roxb.ex Buch.-Ham. (Clusiaceae)	<i>Brikshamla</i> (Ay)	Young fruits are taken as raw to get cure from hepatitis <sup>51</sup> .	Study on dry fruit for hepatoprotective activity is already documented but effect of young raw fruit yet to be explored.
34.	<i>Gossypium herbaceum</i> L. (Malvaceae)	<i>Karpasam</i> (Ay)	One spoonful of leaf juice drunk with honey twice a day to cure hepatic disorder <sup>15</sup> .	No study is available regarding this use.
35.	<i>Gynura cusimbua</i> (D.Don.) S.Moore (Asteraceae)	<i>Terapaibi</i> (Manipuri)	Juice extracted from succulent stems and leaves are taken orally during Hepatitis <sup>51</sup> .	Study yet to be proved
36.	<i>Hedyotis auricularia</i> L. (Rubiaceae)	<i>Long-bankaukha</i> (Manipuri)	Whole plant Decoction taken internally for hepatitis <sup>51</sup> .	Study yet to be proved
37.	<i>Juniperus procera</i> Hochst. Ex Endl. (Cupressaceae)	<i>Hapusa</i> (Ay)	The resin of <i>J. procera</i> in combination with honey is also used as cure for liver diseases and ulcers <sup>30</sup> .	Different fraction obtained from the aerial parts of showed significant activity as hepatoprotective <sup>74</sup> .
38.	<i>Lantana camara</i> L.(Verbenaceae)	<i>Caturangi</i> (Ay)	Decoction of flowering tips taken internally during hepatitis <sup>51</sup> .	Several studies have documented this plant as a hepatotoxic agent but effect of flowering tips yet to be proved.
39.	<i>Lawsonia inermis</i> L. (Ly-	<i>Madayantika</i> (Ay)	A spoonful of leaf juice	Water extract of the plant proved as hepatoprotective <sup>75</sup> .



	thracea)		is consumed daily till cure the jaundice <sup>15</sup> .	
40.	<i>Lepidium sativum</i> L. (Cruciferae)	Chandrashura (Ay)	Various parts of plant have been used for the treatment of jaundice, liver problems and spleen diseases <sup>40</sup> .	Seed extract proved as hepatoprotective agent
41.	<i>Leucas aspera</i> (Willd.)Link Lamiaceae	Dronapuspi (Ay)	Decoction of whole plant is taken internally in Hepatitis <sup>51</sup> .	Study proved whole plant and leaf separately as hepatoprotective.
42.	<i>Luffa acutangula</i> (L.) Roxb. (Cucurbitaceae)	Koshataki (Ay)	Powdered fruit is smelled as snuff to cure the jaundice <sup>15</sup> .	Study yet to be proved
43.	<i>Moringa oleifera</i> Lam. (Morinaceae)	Shigru(Ay)	The leaves, flowers, root, gums, fruit, and seed used for the treatment of liver disease <sup>31</sup> .	Almost all part has already proved but effect of gum yet to be explored.
44.	<i>Mentha spicata</i> L. (Lamiaceae)	Pudina (Ay)	Leaf juice about half Cup, is given at morning and evening for hepatic disorder <sup>15</sup> .	Study yet to be proved
45.	<i>Mimosa pudica</i> L. (Mimosaceae)	Lajjalu(Ay)	Decoction of root (3 to 4 gm) given along with honey in chronic liver prob-	Root and leaves extracts proved as hepatoprotective in animal model.

		lem <sup>15</sup> .	
<b>46.</b>	<i>Musa paradisiaca</i> L. (Musaceae)	<i>Kadali</i> (Ay)	Extract of stem parts is taken orally during Hepatitis <sup>51</sup> . Leaves and stem extracts proved as hepatoprotective agent
<b>47.</b>	<i>Mussaenda glabrata</i> (Hook.f.). Hutch. ex Gamble (Rubiaceae)	<i>Shriparni</i> (Ay)	Juice of fresh leaves is taken internally during Hepatitis <sup>51</sup> . Various leaves extracts has proved as hepatoprotective action in animal study.
<b>48.</b>	<i>Nigella sativa</i> L. (Ranunculaceae)	<i>Krishna-jeeraka</i> (Ay)	According to Islamic and Arab literature, black seed is one of the most powerful herbal drugs used as liver tonics and remedy for jaundice <sup>32, 33</sup> . Various recent studies have proved its seed extract and seed oil effected against hepatotoxicity.
<b>49.</b>	<i>Nyctanthes arbour-tristis</i> L. (Oleaceae)	<i>Parijata</i> (Ay)	Decoction of root given internally in Hepatitis <sup>51</sup> . Study yet to be explored. (Bark and leaf already proved)
<b>50.</b>	<i>Nymphoides indica</i> (L.) Kuntze (Menyanthaceae)	<i>Neyaambel</i> (M)	Paste of whole plant is used in Hepatitis <sup>51</sup> . Study not available
<b>51.</b>	<i>Ocimum sanctum</i> L. (Lamiaceae)	<i>Tulashi</i> (Ay)	Juice of fresh leaves about one spoonful is given twice daily for a 10 days in chronic liver problem <sup>15</sup> . Alcoholic leaves extracts has proved as hepatoprotective agent <sup>76</sup> .
<b>52.</b>	<i>Paspalum scrobiculatum</i> L. (Poaceae)	<i>Kaudravam</i> (Ay)	Plant is used for inflammation and disorder of liver. Several studies have proved the plant as a hepatoprotective.
<b>53.</b>	<i>Pergularia</i>	<i>Uttamarani</i>	In tradi- Aqueous and ethanolic extract of the

<p><i>daemia</i> (Ay) (Forssk.) Chiov. (Apocynaceae)</p>		<p>tional system of medicine the whole aerial part of the plant is extensively used for the treatment of jaundice, liver diseases<sup>33,34</sup>.</p>	<p>plant part proved as a hepatoprotective agent.</p>
<p>54. <i>Pimpinella anisum</i> L.(Umbelliferae)</p>	<p>Sweet cumin</p>	<p>The plant is used as digestive, carminative, antispasmodic, and liver disorders<sup>35</sup>.</p>	<p>Various studies have proved its seeds extract as hepatoprotective.</p>
<p>55. <i>Piper longum</i> L. (Piperaceae)</p>	<p><i>Pippali</i> (Ay)</p>	<p>1-2 fruits boiled with milk in cirrhosis gradually increased up to 10 then again decreased<sup>16</sup>.</p>	<p>Hepatoprotective effect of <i>Piper longum</i> milk extract was observed in CCl<sub>4</sub> induced hepatic damage<sup>77</sup>.</p>
<p>56. <i>Punica granatum</i> L. (Puniceae)</p>	<p><i>Dadimba</i> (Ay)</p>	<p>Half cup of fruit juice for twice a day given for two weeks to the patients suffering from jaundice<sup>15</sup>.</p>	<p>Several studies are available indicated its hepatoprotective action in different form and part.</p>
<p>57. <i>Phyllanthus amarus</i> Schumach. &amp; Thonn. (Euphorbiaceae)</p>	<p><i>Thamalaki</i> (Ay)</p>	<p>Leaves mixed with curd given orally for jaundice-3 spoonfuls twice a day for 7 days. A cup of decoction of entire plant is given</p>	<p>Efficacy with curd yet to be proved.</p>

			orally twice day for jaundice till cure <sup>15</sup> .	
58.	<i>Physalis minima</i> L. (Solanaceae)	<i>Mrudukunchika</i> (Ay)	Leaf extract (15-20ml) mixed with buffalo or sheep curd combinations <sup>17</sup> .	Leaf extract already proved but study not available with buffalo or sheep curd.
59.	<i>Picrorhiza kurroa</i> Royle Benth.	<i>Katuki</i> (Ay)	One teaspoonful of root powder mixed with honey should be taken thrice daily <sup>15</sup> .	Several studies have proved as it is potent hepatoprotective agent.
60.	<i>Portulaca oleracea</i> L. (Portulacaceae)	Hog weed	Used for the treatment of gastrointestinal & liver disorders, <sup>36</sup>	Several in vivo study proved that efficacy.
61.	<i>Ricinus communis</i> L. (Euphorbiaceae)	<i>Eranda</i> (Ay)	Extract of one leaf is added in half cup of fresh unboiled cow milk and given to cure Jaundice <sup>15</sup> .	Leaves extracts has documented as hepatoprotective agent through in vivo study.
62.	<i>Saccharum officinarum</i> L. (Poaceae)	<i>Ikshu</i> (Ay)	Juice is given twice a day to cure Jaundice <sup>15</sup> .	Juice is documented as hepatoprotective agent.
63.	<i>Solanum nigrum</i> L. (Solanaceae)	<i>Kakamaci</i> (Ay)	The plant is a household remedy for liver disorders, jaundice and cirrhosis <sup>37</sup> .	Aqueous and ethanol extracts proved as hepatoprotective agents.
64.	<i>Tabernaemontana divaricata</i> (L.) R.Br.	<i>Nandivirksha</i> (Ay)	Extract of dried roots used for jaundice	Study on other part has already been documented but effect of root yet to be explored.

Roem. & Schult. (Apocynaceae)		and liver disorder.	
65. <i>Tamarindus indica</i> L. (Casealpiniaceae)	<i>Cincha</i> (Ay)	Rind of pods is burnt. Then 3-5gm of ash mixed in one spoonful of cow's urine and taken orally for three to four times a day to cure jaundice <sup>15</sup> .	Study should be done to see the efficacy with cows urine as not yet proved.
66. <i>Tamarix nilotica</i> (Ehrenb.) Bunge (Tamaricaceae)	<i>Jhauber</i> (Ay)	Mentioned as "Canon of medicine" for the treatment of liver <sup>38</sup> .	Recent studies have proved its efficacy.
67. <i>Tephrosia purpurea</i> (L.) Pers. (Fabaceae)	<i>Sara-punkha</i> (Ay)	Root extract (10ml) mixed with a pinch of salt for Liver related stomach pain <sup>15</sup> .	Several studies have documented the root as hepatoprotective agent.
68. <i>Terminalia chebula</i> Retz. (Combretaceae)	<i>Haritaki</i> (Ay)	Consumption of two fruit boiled in cow urine at morning for three days to cure jaundice <sup>15</sup> .	Study yet to be proved regarding the use of this formulation.
69. <i>Terminalia paniculata</i> Roth [Unsolved Name] (Combretaceae)	<i>Aswakarna</i> (Ay)	Bark is used for Jaundice.	Several studies also proved the efficacy of this drug.
70. <i>Tribulus terrestris</i> L. (Zygophyllaceae)	<i>Gokshura</i> (Ay)	The seeds and fruit of this plant are recommended in	Various studies are also scientifically proved its efficacy.

		liver disorder <sup>39</sup> .	
71.	<i>Ziziphus mauritiana</i> Lam. (Ay) [Unsolved Name] (Rhamnaceae)	<i>Karkandhu</i> Fruits and leaves decoction with honey taken orally for Hepatitis <sup>51</sup> .	Both fruits and leaves are proved as hepatoprotective agent.

Ay-Ayurvedic Name; AP-Andhrapradesh regional name.

## DISCUSSION

Due to wide range of climatic condition India holds rich variety of flora. Since ancient times, plants have been widely used as medicine in India. Systematic documentation of folklore medicinal practices has introduced many new medicinal plants to the Modern as well as to the Ayurvedic system of medicine<sup>41</sup>. According to ancient Ayurvedic scholar, there is no such *dravya* (substance) in the Universe, which has no medicinal value. This definition rightly suggests that in principle, all plants have a potential medicinal value<sup>42</sup>. Medicinal plants have been considered as important therapeutic aid for alleviating ailment of humankind. The present review thrashed out different types of medicinal plants restrains hepatoprotective activity or used in liver disorder (Table-1). Some of these plants like *Khadira*, *Apam-raga*, *Vilva*, *Punarnava*, *Kumari*, *Bhunimba* (Table-1) etc. are already been documented in Ayurvedic texts as a remedy for liver disorders. Although the experimental evaluations were carried out on a good number of these plants and formulations, the studies were mostly incomplete and insufficient. A phytotherapeutic approach to modern drug development can provide many invaluable drugs from traditional medicinal plants. Search for pure phytochemicals as drugs is time consuming and expensive<sup>43</sup>. Numerous plants and polyherbal formulations are used for the

treatment of liver diseases. However, in most of the severe cases, the treatments are not satisfactory. Numbers of famous medicinal plants are already proverbial to us as a famous liver tonic and references are available in classical *Ayurvedic* texts regarding their pharmacological actions and uses. Some of them are *Madhusigru* (*Moringa concanensis*), *Rohitaka* (*Tecoma undulata*), *Guduchi* (*Tinospora cordifolia*), *Daruharidra* (*Berberis aristata*), *Pareesha* (*Thespesia populenea*), *Bhumi amalaki* (*Phyllanthus niruri*) etc. These plants are extensively used in various Ayurvedic hepato protective formulations. Extensive use of certain medicinal plants is responsible for destruction of such plant species. Hence focus can be given on different kinds of formulation based on not commonly used medicinal plants. Such kind of practices may provide vital role in conservation aspect of endangered medicinal plants. Also development of such medicines with standards of safety and efficacy can revitalise treatment of liver disorders and hepato-protective activity. Although the meta-analysis of available scientific literature on hepatoprotective activity of the herbs to a great extent substantiates folkloric claims about the usefulness of these botanicals to treat chronic liver diseases<sup>44</sup>, the data regarding clinical trials, safety studies, and quality control of many of these herbs is far from satisfactory.

## CONCLUSION

Medicinal plants play a key role in human health care. Numbers of medicinal

plants have been used conventionally by traditional practitioners worldwide for the prevention and treatment various diseases. Sometimes such unwritten rich sources of knowledge are destroyed due to lack of safeguarding. Thus protecting traditional and National heritage of healing knowledge through documentation becomes obligatory. Also there is enough scope of the amalgamation of these drugs in the main stream of medication after subjected to the phytochemical and biological screening, together with clinical trials. Present study may provide relevant information to the researcher in screening and evaluation of phyto-constituents of various liver diseases.

## REFERENCES

1. Plants in folk medicines in India. (Downloaded on 06/04/2015). Available at [http://www.science20.com/humboldt\_fellow\_and\_science/blog/plants\_folk\_medicines\_india].
2. Suruchi Singh, Maryam Bincy Thomas, Sharada Pal Singh, D.Bhowmik. Plants used in hepatoprotective remedies in traditional Indian medicine. Indian Journal of Research in Pharmacy and Biotechnology, 2013; 1(1): 58
3. Ram Vishal. Protective role of Indian medicinal plants against liver damage. The Journal of Phytopharmacology 2013; 2(3): 1-3
4. Mary Wu, Cindy Cheng. Liver Disease in Traditional Chinese Medicine. Toronto School of Traditional Chinese Medicine. 709 Research Report August, 2011.p.1-31
5. Ram Vishal. Protective role of Indian medicinal plants against liver damage. The Journal of Phytopharmacology 2013; 2(3):2
6. Subramoniam A, Pushpangadan P. Development of phytomedicines for liver disease. 1999; 31- 3: 166-175.
7. Recknagel RO. A new direction in the study of carbon tetrachloride hepatotoxicity, Life Sci. 1983; 33: 401-8.
8. Wendel A, Feuersteins S, Konz KH. Acute paracetamolintoxication of starved mice leads to lipid peroxidation in vivo. Biochem pharmacol. 1987; 28: 2051-3.
9. Dianzani MU, Muzia G, Biocca ME, Canuto RA. Lipidperoxidation in fatty liver induced by caffeine in rats. Int JTiss Reac. 1991; 13: 79-85.
10. Hiroshi A, Toshharu H, Masahiro H, Shoji A. An alteration in liver microsomal membrane of the rat following paracetamol overdose. J Pharm pharmacol. 1987; 39: 1047-9.
11. Pandey Govind P. Pharmacological studies of Livol(R) with special reference to liver function. MVSc & AH thesis. Jabalpur, MP, India: JNKVV; 1980.
12. Pandey Govind, Medicinal plants against liver diseases. InterNational research journal of pharmacy. 2011; 2 (5): 115-121.
13. Sharma R. Medicinal Plants of India-An Encyclopedia. Delhi: Daya Publishing Home; 2003.
14. Ram Vishal. Protective role of Indian medicinal plants against liver damage. The Journal of Phytopharmacology 2013; 2(3):1
15. Shubhangi Pawar. Plant Based Folk Recipes For Treatment of Hepatic Disorders In Jalgaon District (M.S.) India. InterNational Journal of Basic and Applied Sciences, 2012; 1 (2):109-114
16. Patel, J. A., Shah, U. S. Hepatoprotective activity of *Piper longum* traditional milk extract on carbon tetrachloride induced liver toxicity

- in Wistar rats. *Boletín Latinoamericano y del Caribe de Plantas Medicinales y Aromáticas* 2009 ; 8 (2) :121-129
17. G.Sabjan, G.Sudarsanam, D.Dharaneeshwara Reddy, D.Muralidhara Rao. Ethno-botanical crude drugs Used in Treatment of Liver diseases by Chenchu Tribes in Nallamalais, Andhra Pradesh, India. *American Journal of Ethno medicine*, 2014; 1(3): 115-121
18. Abdulrahman K. Al-Asmari, Abdulrahman M. Al-Elaiwi, Md Tanwir Athar, Mohammad Tariq, Ahmed Al Eid, Saeed M. Al-Asmary. A Review of Hepatoprotective Plants Used in Saudi Traditional Medicine. *Evidence-Based Complementary and Alternative Medicine*, 2014; 1: 22.
19. S. R. Bammidi, S. S. Volluri, S. C.Chippada, S. Avanigadda, and M.Vangalapati, "Are view on pharmacological studies of *Bacopa monniera*," *Journal of Chemical, Biological and Physical Sciences*, 2011; 1(2) : 250–259.
20. Anonymous, Brahmi: "Herbs of Grace", [Home page on internet] Downloaded on 13/01/15. Available at <http://www.ayurveda-college.com/articles/students/Brahmi>.
21. J. Yadav and M. Panghal, "Balanites aegyptiaca (L.) Del. (Hingot): a review of its traditional uses, Phytochemistry and pharmacological properties," *InterNational Journal of Green Pharmacy*, 2010; 4(3): 140–146.
22. N. K. Jain and A. K. Singhai, "Protective role of Beta vulgaris L. leaves extract and fractions on ethanol-mediated hepatic toxicity," *Acta Poloniae Pharmaceutica—Drug Research*, 2012; 69(5): 945–950.
23. R. N. Chopra, S. L. Nayar, I. C. Chopra. *Glossary of Indian Medicinal Plants*. New Delhi, India: CSIR publication, 1956.
24. A. A. Al-Zahim, N. Y. Al-Malki, F. M. Al-Abdulkarim, S. A. Al-Sofayan, H. A. Abunab and A. A. Abdo, "Use of alternative medicine by Saudi liver disease patients attending a tertiary care centre: prevalence and attitudes," *Saudi Journal of Gastroenterology*, 2013;19(2): 75–80.
25. D. Schuppan, J. I.-D. Jia, B. Brinkhaus, and E. G. Hahn, "Herbal products for liver diseases: A therapeutic challenge for the new millennium," *Hepatology*, 1999; 30(4):1099–1104.
26. Anonymous, *Unani Pharmacopoeia of India (In Urdu)*, vol. II., New Delhi: G.o.I. Unani Pharmacopoeial Committee, 2007.p. 21
27. D. Alter, "TURMERIC," [Home page on internet] Subscribed on 24/01/15 available at <http://www.herballegacy.com/AlterHistory.html>.
28. C. P´erez, J. R. Canal, J. E. Campillo, A. Romero, and M. D. Torres, "Hypotriglyceridaemic activity of *Ficus carica* leaves in experimental hypertriglyceridaemic rats," *Phytotherapy Research*, 1999; 13(3): 188–19.
29. J. R. Canal, M. D. Torres, A. Romero, and C. P´erez, "A chloro- form extract obtained from a decoction of *Ficus carica* leaves improves the cholesterol-aemic status of rats with strep tozotocin- induced diabetes," *Acta Physiologica Hungarica*, 2000; 87(1): 71–76.
30. J.M.Greenson, B. Sanford, and D. A. Monti, "St. John's wort (*Hypericum perforatum*): a review of the current pharmacological, toxicological, and clinical literature," *Psychopharmacology*, 2001;153(4): 402–414.



31. F. Anwar, S. Latif, M. Ashraf, and A. H. Gilani, "Moringa oleifera: a food plant with multiple medicinal uses," *Phytotherapy Research*, 2007; 21(1):17–25.
32. M. Tariq, "Nigella sativa seeds: folklore treatment in modern day medicine," *Saudi Journal of Gastroenterology*, 2008; 14(3):105–106.
33. M. L. A. Khan, "Tibb-Al-Nabvi:Nigella sativa," *Islamic Voice*, 1999; 13–18(152):1–2.
34. S.V.Suresh kumar, S.H.Mishra, "Hepatoprotective effect of extracts from *Pergularia daemia* Forsk," *Journal of Ethnopharmacology*, 2006; 107(2):164–168.
35. M. M. "Ozcan and J. C. Chalchat, "Chemical composition and antifungal effect of anise (*Pimpinella anisum* L.) Fruit oil at ripening stage" *Annals of Microbiology*, 2006; 56(4): 353– 358.
36. M. Ahmad, A. Itoo, I. Baba, S. M. Jain, and R. C. Saxena, "Hepatoprotective activity of *Portulaca oleracea* Linn. on experimental animal model," *InterNational Journal of Pharmacy and Pharmaceutical Sciences*, 2013; 5(3): 267–269.
37. N. N. Wannang, J. A. Anuka, H. O. Kwanashie, S. S. Gyang, and A. Auta, "Anti-seizure activity of the aqueous leaf extract of *Solanum nigrum* Linn. (solanaceae) in experimental animals," *African Health Sciences*, 2008; 8(2): 74–79.
38. I. Sina, *Al Qanoon Fil Tib*, vol. 522, Mataba Munshi Naval Kishore, Lucknow, India, 2007.
39. A. Amin, M. Lotfy, M. Shafiullah, and E. Adeghate, "The protective effect of *Tribulus terrestris* in diabetes," *Annals of the New York Academy of Sciences*, 2006; 1084: 391–401,
40. D. Manohar, G. L. Viswanatha, S. Nagesh, V. Jain, and H. N. Shivaprasad, "Ethnopharmacology of *Lepidium sativum* Linn. (Brassicaceae): a review," *InterNational Journal of Phytotherapy Research*, 2012; 2(1):1–7.
41. Bidhan Mahajon, Ravi Shankar B, Remadevi R, Assessment of 'vipaka' (metabolism) of a new medicinal plant in animal model, *Global J Res. Med. Plants & Indigen. Med.* 2014; 11(3): 427-434.
42. Suruchi Singh, Maryam Bincy Thomas, Sharada Pal Singh, D.Bhowmik. Plants used in hepatoprotective remedies in traditional Indian medicine. *Indian Journal of Research in Pharmacy and Biotechnology*, 2013; 1(1): 58
43. Suruchi Singh, Maryam Bincy Thomas, Sharada Pal Singh, D.Bhowmik. Plants used in hepatoprotective remedies in traditional Indian medicine. *Indian Journal of Research in Pharmacy and Biotechnology*, 2013; 1(1): 60
44. Abdulrahman K. Al-Asmari, Abdulrahman M. Al-Elaiwi, Md Tanwir Athar, Mohammad Tariq, Ahmed Al Eid, Saeed M. Al-Asmary. A Review of Hepatoprotective Plants Used in Saudi Traditional Medicine. *Evidence-Based Complementary and Alternative Medicine*, 2014; 1: 13.
45. Angana Roy Chaudhury, Health Traditions of Kanis-'The people of the forest', *Heritage Amruth-A Magazine for Healthy Living The Natural Way*, 2014;10(6):17
46. Satya Narayin, Usha singh. Contribution to the Ethnobotanical plants of Mirzapur District(U.P). *Indian Folk Medicine and other plant based product* edited by V.Singh. Jodhpur: Scientific Publisher India,2007.p.15

47. Neelam Pereira. Ethnobotanical Relevance in Tribal life-A study on Warli Tribe of Thane District, Maharashtra, India. Indian Folk Medicine and other plant based product edited by V.Singh. Jodhpur: Scientific Publisher India, 2007.p.36
48. Sasidharan Augustine. Ethno botany of the tribes living in and around the Periyar Tiger Reserve. Indian Folk Medicine and other plant based product edited by V.Singh. Jodhpur: Scientific Publisher India, 2007.p.52
49. Sasidharan Augustine. Ethno botany of the tribes living in and around the Periyar Tiger Reserve. Indian Folk Medicine and other plant based product edited by V.Singh. Jodhpur: Scientific Publisher India, 2007.p.55
50. Kumar, Yadav. Important Ethnomedicinal plants of Family Poaceae in Gaya District, Bihar. Indian Folk Medicine and other plant based product edited by V.Singh. Jodhpur: Scientific Publisher India, 2007.p.175
51. Dutta Chaudhury, Shil. Some traditional antihepatitis plant used by the peoples of Manipur. Indian Folk Medicine and other plant based product edited by V.Singh. Jodhpur: Scientific Publisher India, 2007.p.175
52. P Jayasekhar, PV Mohanan, K Rathinam. Hepatoprotective activity of ethyl acetate extract of *Acacia catechu*, Indian Journal of Pharmacology 1997; 29(6): 426-428
53. G.R Battua, B.M. Kumara Hepatoprotective Activity Of *Abrus Precatorius* Linn. Against Paracetamol Induced Hepatotoxicity In Rats. Pharmacologyonline 2009; 3: 366-375
54. Pal, Rishi; Hooda, Mangal Sain; Chain Singh Bias; Singh, Janardhan. Hepatoprotective Activity of *Acacia senegal* Pod against Carbon Tetrachloride- Induced Hepatotoxicity in Rats. International Journal of Pharmaceutical Sciences 2014; 26 (1) : 165
55. S V Suresh Kumar, G Chandrika, K Mahesh, PVS Meghanath. Hepatoprotective Activity Of *Achyranthes Aspera* Linn Against Paracetamol Induced Toxicity. International Journal of Pharmacy and Pharmaceutical Sciences, 2012; 4(Suppl 5): 299-302
56. Ramnik Singh, Harwinder Singh Rao. Hepatoprotective effect of the pulp/seed of *Aegle marmelos* correa ex Roxb against carbon tetrachloride induced liver damage in rats. IJGP 2008 ; 2 (4): 232-234.
57. Chandan BK et al...Hepatoprotective potential of *Aloe barbadensis* Mill. against carbon tetrachloride induced hepatotoxicity. J Ethnopharmacol. 2007;111(3):560-6.
58. A. Nasir, M.G. Abubakar, R.A. Shehu, U. Aliyu, and B.K. Toge. Hepatoprotective Effect of the Aqueous Leaf Extract of *Andrographis paniculata* Nees Against Carbon Tetrachloride – Induced Hepatotoxicity in Rats. Nigerian Journal of Basic and Applied Sciences 2013; 21(1): 45-54.
59. Singh A, Handa SS. Hepatoprotective activity of *Apium graveolens* and *Hygrophila auriculata* against paracetamol and thioacetamide intoxication in rats. J Ethnopharmacol. 1995 15;49(3):119-26.
60. Epatoprotective Activity Of Plant *Argemone Mexicana* (Linn). Against Carbon Tetrachloride (Ccl4 ) Induced Hepatotoxicity In Rats. International Journal of Pharma Research and Development 2009; 8: 1-20
61. Rupesh kumar, Fasalu Rahiman, Tamizh Mani, Satya Kumar. Evaluation Of Hepatoprotective Activity Of *Asparagus Racemosus* Root Against

- Paracetamol Induced Acute Liver Injury In Rats. *Pharmacologyonline*, 2011; 1:1059-1066
62. Radha Palaniswamy, Padma Palghat Raghunathan . Protective Effect Of Bacopa Monnieri Leaf Extract Against Oxidative Stress Induced Hepatotoxicity In Rats. *International Journal of Pharmacy and Pharmaceutical Sciences* , 2013; 5( Suppl 3): 555-558
63. B. Jaiprakash , Aland , Rajkumar , R. V. Karadi , R. V. Savadi , V. L. Hukkeri Hepatoprotective Activity of Bark of *Balanites aegyptiaca* Linn. *Journal of Natural remedies* , 2003; 3(2):205 – 207
64. Das, S.K.; Roy, C. The protective role of benincasa hispida on Nimesulide-induced hepatotoxicity in albino rat model. *Int. J Green Pharm.* 2011, 5, 192-197.
65. Ranju Pal; Kundlik Girhepunje; Hitesh Gevariya; Thirumoorthy, N. Hepatoprotective activity of Beta vulgaris against CCL4 induced acute hepatotoxicity in rats. *Archives of Applied Science Research.* 2010, 2(1), 14-18.
66. Chandan BK, Sharma AK, Anand KK. Boerhaavia diffusa: a study of its hepatoprotective activity. *J Ethnopharmacol.* 1991;31(3):299-307.
67. Siddhartha Singh, Archana Mehta and Pradeep Mehta. Hepatoprotective Activity Of Cajanus Cajan Against Carbon Tetrachloride Induced Liver Damage. *International Journal of Pharmacy and Pharmaceutical Sciences* 2011; 3( Suppl 2): 146-147
68. Singaravel Sengottuvelu, Srinivasan Duraisami, Jothivel Nandhakumar, Rasilingam Duraisami, Mani Vasudevan. Hepatoprotective Activity of *Camellia sinensis* and its Possible Mechanism of Action. *IJPT* 2008 7(1) : 9-14
69. Vunta Prabhakaran, Diviti Ranganayakulu. Hepatoprotective Activity Of *Canavalia Gladiata* Root Extract On D-Galactosamine Induced Hepatic Damage. *International Journal of Biological & Pharmaceutical Research* .2014; 5(2): 125-130
70. Raj Kapoor B<sup>1</sup>, Jayakar B, Kavimani S, Muruges N. Effect of dried fruits of *Carica papaya* Linn on hepatotoxicity. *Biol Pharm Bull.* 2002 ; 25(12):1645-6.
71. Kuppan Nithianantham , Murugesan Shyamala , Yeng Chen 2, Lachimanan Yoga Latha , Subramanion L. Jothy, Sreenivasan Sasidharan. Hepatoprotective Potential of Clitoria ternatea Leaf Extract Against Paracetamol Induced Damage in Mice *Molecules* 2011; 16:10134-10145.
72. Suzy M Salama, Mahmood Ameen Abdulla, Ahmed S AlRashdi, Salmah Ismail, Salim S Alkiyumi. Shahram Golbabapour. Hepatoprotective effect of ethanolic extract of *Curcuma longa* on thioacetamide induced liver cirrhosis in rats. *BMC Complementary and Alternative Medicine* 2013; 13:56.
73. Panda Amaresh, Rath Seemanchala, Pradhan Debashis, Mahanty Arpan, Gupta Bijan Kumar, Bala Nripendra Nath. Hepatoprotective Activity of Whole Part of the Plant Cuscuta reflexa Roxb. (Convolvulaceae) in Chloroform, Ethanol and Paracetamol Induced Hepatotoxic Rat Models. *International Journal of Pharmaceutical and Clinical Research* 2014; 6(2): 127-132
74. Saleh Ibrahim Alqasoumi, Abdallah Ibrahim Farraj, Maged Saad Abdel-Kader, Study of the hepatoprotective effect of Juniperus phoenicea constituents. *Pak. J. Pharm. Sci.*, Vol.26, No.5, September 2013; 999-1008

75. Chowdhury Mobaswar Hossain, Himangshu Sekhar Maji, Pranabesh Chakraborty. Hepatoprotective Activity Of Lawsonia Inermis Linn, Warm Aqueous Extract In Carbon Tetrachloride Induced Hepatic Injury In Wister Rats. Asian Journal of Pharmaceutical and Clinical Research, 2011; 4(3): 106-109
76. RR Chattopadhyay, SK Sarkar, S Ganguly, C Medda, TK Basu. Hepatoprotective activity of Ocimum sanctum leaf extract against paracetamol induced hepatic damage in rats. Indian Journal of Pharmacology 1992 ; 24 (3) : 163-165
77. Jagruti A. Patel, Urvi S. Shah. Hepatoprotective activity of Piper longum traditional milk extract on carbon tetrachloride induced liver toxicity in Wistar rats. Boletín Latinoamericano y del Caribe de Plantas Medicinales y Aromáticas, 2009; 8 (2): 121 – 129

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*Source of support: Nil*

*Conflict of interest: None Declared*