

Conceptual Study on Hepatoprotective Activity of *Visharasayana*

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ABSTRACT

Liver plays an important role in many bodily functions, from protein production and blood clotting to cholesterol, glucose and iron metabolism. The liver can be damaged in a variety of ways. Management of liver diseases is a major health challenge today, not only for the healthcare professionals, but also for the pharmaceutical industry and drug regulatory agencies. *Ayurvedic* medicines have been used for a long time in the treatment of liver diseases and a number of *Ayurvedic* preparations are available in the market. Here, the hepato-protective activity of one such preparation, *Visharasayana*, is being reviewed. Most of the contents of *Visharasayana* have been evaluated according to the research done by various research scholars, and on the basis of *Ayurvedic* pharmacology (*Rasa, Guna, Virya, Vipaka*) described in *Ayurvedic* texts. In this research paper we are try to establish the claims of old *Ayurvedic* text on the recent research parameters.

Key words : *Ayurveda*, Hepatoprotective, *Visharasayana*

INTRODUCTION

Liver is the largest vital organ in body plays an important role in many bodily functions from protein production and blood clotting to cholesterol, glucose and iron metabolism. Liver disease, also referred to as hepatic disease, is a broad term that covers all the potential problems that cause the liver to fail to perform its designated functions. A variety of illness can affect the liver, e.g. certain drugs like acetaminophen, cirrhosis, alcohol abuse, hepatitis, non alcoholic liver disease, iron load (hemochromatosis), viruses, blood flow abnormalities etc. ^[1] According to WHO, liver disease rates are steadily increasing over the years. According to national statistics in the UK, liver diseases have been ranked as the fifth most common cause of death. ^[2] It is recognised as the second leading cause of mortality amongst all digestive diseases in the US. ^[3] *Ayurveda* treaties have a vast treasure of drugs mentioned for the treatment of hepatic diseases. *Visharasayana* is a herbo-mineral *Ayurvedic* medicine for the management of liver disorder and many

other disorders. As per *Rasatarangini*, *Visharasayana* is useful for the treatment of following disorders: ^[4]

1. *Yakrita vikara* (~ Liver disorders)
2. *Pleeha vikara* (~Spleen disorders)
3. *Udarashoola* (~Abdominal pain)
4. *Ajeerna* (~Indigestion)
5. *Aanaha* (~Flatulence)
6. *Agnideepana* (~Appetizer)
7. *As Rasayana* (~Rejuvenator)

MATERIAL AND METHOD

This article is based on literary review of the contents related to *Visharasayana* and its constituents. For this purpose, various *Ayurvedic* texts like *Charaka*, *Sushruta* and *Nighantus* were consulted, along with different journals and websites.

REVIEW

Only the hepatoprotective activities of the contents of *Visharasayana* are being discussed in detail here. Their general *Ayurvedic* properties, chemical composition and medicinal properties have just being summarised in [Table 1 to 3].

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Table 1: Ayurvedic Pharmacological Properties of the Ingredients of Visharasayana [4-5]

S. N.	Drug name	Rasa (Taste)	Guna (Quality)	Virya (Potency)	Vipaka (Metabolic property)	Part used	Quantity
1.	Vatsanabha (Aconitum ferox)	Katu, Tikta, Kashaya, Madhura	Ruksha, Teekshna, Laghu, Vyavayi, Vikasi	Ushana	Madhura	Root	11.11%
2.	Shunthi (Zingiber officinale)	Katu	Laghu, Snigdha	Ushana	Madhura	Tuber	5.55%
3.	Maricha (Piper nigrum)	Katu	Laghu, Teekshna	Ushana	Katu	Fruit	5.55%
4.	Pippali (Piper longum)	Katu	Laghu, Snigdha, Teekshna	Anushan-sheeta	Madhura	Fruit	5.55%
5.	Daalchini (Cinnamomum zeylanicum)	Katu, Tikta, Madhura	Laghu, Ruksha, Teekshna	Ushana	Katu	Bark	5.55%
6.	Ella (Elettaria cardamomum)	Katu, Madhura	Laghu, Ruksha	Sheeta	Madhura	Seed	5.55%
7.	Tejpatra (Cinnamomum tamala)	Katu, Tikta, Madhura	Laghu, Ruksha, Teekshna	Ushana	Katu	Leaves	5.55%
8.	Naagkeshar (Mesua ferrea)	Kshaya, Tikta	Laghu, Ruksha	Ushana	Katu	Stigma	5.55%
9.	Chitrak (Plumbago zeylanica)	Katu	Laghu, Ruksha, Teekshna	Ushana	Katu	Root bark	5.55%
10.	Rasasindoor	Tikta, Katu, Kashaya,	-	Ushana	-	-	11.11%
11.	Hingula	Tikta, Katu, Kashaya,	-	Ushana	-	-	11.11%
12.	Rajata (Argentum)	Kashaya, Amla	Snigdha, Sara, Guru	Sheeta	Madhura	Ash	11.11%
13.	Tamra (Cuprum)	Tikta, Kshaya, Madhura	Snigdha	Ushana	Katu	Ash	11.11%

Table 2: Chemical Composition of Each Individual Drug of Visharasayana

S.N.	Drug	Chemical composition
1.	Vatsanabha (Monk's hood)	Aconite, aconitine, pseudoaconitine, bikhaconitine, diacetylpseudoaconitine, aconine, picroaconine, diterpene, veratrypseudoaconitine, veratrylgama aconine. [6]
2.	Shunthi (Dry zinger)	Gingerols, shogaols, paradols and zingeronezingerberene, curcumene, farnesene. [7]
3.	Maricha (Black pepper)	Piperine, lauric acid, palmitic acid, ascorbic acid [8]
4.	Pippali (Long peeper)	Piperine, piplartine, piplasterol, piperonaline, piperettine, asarinine, pellitorine, piperundecalidine, piperlongumin [9]
5.	Daalchini	Cinnamaldehyde, trans-cinnamaldehyde, eugenol, linolool [10]
6.	Ella (Cardamom)	Cineol, terpineol, terpinene, protocatchualdehyde, protocatchuic acid, alpha-terpinyl acetate, linalyl acetate, limonene, linalool, limonene [11]
7.	Tejpatra	Furanosquiterpenoids, Furanogermene, β -caryophyllene, sabinene, curcumenol [12]
8.	Naagakeshara (Cobra's saffron)	Mesulol, Mesuaferrol, leucoanthocyanidin, Mesuone, Mesuagin, Mesuarin, Mesuein, ferraxanthene [13]
9.	Chitraka	Plumbagin, Elliptinone, Maritnone, Biplumbagin, Chloroplumbagin, Naphthalene-4, Lapachol [14]
10.	Rasasindoor	Mercuric sulphide (HgS)
11.	Hingula	Cinnabar (HgS)
12.	Rajata bhasma	Silver (Ag)
13.	Tamra bhasma	Copper (Cu)

Table 3: Medicinal Properties of the Individual Constituents of Visharasayana [5]

S.N.	Drug name	Charaka	Sushruta	Uses in Nighantu	Pharmacological property as per modern
1.	Vatsanabha	Shavara visha	Kanda visha	-	-
2.	Shunthi	Triptighna, Arshoghna, Deepaniya, Shoolprashamana, Trishnanigraha na	Pippalyadigana, Tryushna	Atisara, Agnivardhaka, Grahanidosha	Hypolipidemic, anti-inflammatory, antiviral, antioxidative, chemoprotective [15]
3.	Maricha	Deepaniya, Shoola prashamana, Krimighna, Shirovirechana	Pippalyadigana, Tryushna	Deepana, Sarvakashara	Antimicrobial, antioxidant, anti-inflammatory, immunomodulatory, analgesic [16]
4.	Pippali	Kasahara, Deepaniya, Shoolprashamana, Triptighna, Shirovirechana	Pippalyadi, Udhrvabhaghara, Shirovirechan	Shvasa, Kasa, Agnivardhaka, Gulmaghna, Kshyapahama	Antimicrobial, anti-inflammatory, immunomodulatory, antioxidant, analgesic [17]
5.	Daalchini	-	Elladigana	Swasakashara, Kshaya, Peenus, Aruchi, Hrullasa	Antioxidant, antibacterial, anti-inflammatory, analgesic, antipyretic, antimicrobial [18]
6.	Ella	Shvasahara, Angamarda-prashamana, Shirovirechana, Katuka-skandha	Elladigana	Swasakashara, Kshaya, Rochana, Deepana	Antihyperlipidemic, antioxidant, antihyperglycemic [19-20]
7.	Tejpatra	-	Elladigana	Peenasa, Aruchi, Hrullasa	Anti-hyperlipidemic, anti-inflammatory, immunomodulatory, antibacterial, antioxidant [21]
8.	Naagakeshara	-	Elladigana, Priyangvadigana, Anjanadigana	Atisara, Agnivardhaka, Grahanivikara	Antibacterial, antifungal, antispasmodic, anti-inflammatory, antibacterial [13]
9.	Chitraka	Deepaniya, Bhedaniya, Triptighna, Lekhaniya, Shoolprashamana	Pippalyadigana, Mustadigana, Amalakyadigana, Varunadigana, Mushkakadigana	Deepana, Pachana, Shoolahara, Krimihara, Rasayana, Arshoghna	Antibacterial, antifungal, antiviral, anticarcinogenic, antiplasmodial [22]
10.	Rasa sindoor	-	-	Agnimandhyahara, Pittavirechaka	-
11.	Hingula	-	-	Kaphapittahara, Pleehaghna, Kamalahara, Pachaka, Agnivardhaka	-
12.	Rajata bhasma	-	-	Vayasthapana, Balya, Rasayana, Ajeerna-nashaka, Agnimandhyahara, Pleehodaranashaka	Analgesic [23]
13.	Tamra bhasma	-	-	Deepana, Paanduhara, Vishanashana, Kaphapittanashaka, Vaamaka, Virechaka, Grahanihara	-

Hepatoprotective activity of the ingredients of Visharasayana**Hepatoprotective activity of Zingiber officinale (Shunthi)**

Shunthi having the properties of Deepana, Paachana, Ruchya, Aamahara, Kaphavataghna, Shothahara and Udararogahara, helps it to prevent and cure the liver diseases. An experimental study was also done to determine the hepato-protective activity of ethanolic extract of rhizome of *Z. officinale* against thioacetamide induced

hepatotoxicity in rats. These results showed hepatoprotective activity against inducers, as indicated by an improvement in liver functions test. It concluded that *Z. officinale* rhizome possess hepatoprotective activity. [24]

Hepatoprotective activity of *Piper longum* (Pippali)

Pippali having the *Katu rasa, Laghu, Snigdha, Teekshna guna, Agnideepana, Rechana, Kaphavatahara, Udararogahara, Shoola Prashamana* and *Rasayana* properties, which helps to balance the *doshas* involved in the liver diseases. Hepatoprotective action of plant's fruit extract was also assessed against CCl_4 induced acute, chronic reversible and irreversible damage in rodents on various parameters using morphological, biochemical and histopathological. The extract Piperine was found to protect against tertiary butyl hydroperoxide induced and CCl_4 induced hepatotoxicity by lipid peroxidation in vitro and in vivo. Its fruit's extract improved the regeneration process by restricting fibrosis, but there was no protection against acute damage or against cirrhosis. [25, 26]

Hepatoprotective activity of *Piper nigrum* (Maricha)

Nirwane A.M. et al conducted a study to evaluate the effect of methanolic extract of *P. nigrum* fruits in ethanol- CCl_4 induced hepatotoxicity in wistar rats. This study showed that the prophylactic treatment with methanolic extract and piperine of *P. nigrum* with ethanol CCl_4 treatment offered considerable protection to liver assessed on biochemical parameters, which was also supported by the limited extent of histological damage. [27] *Maricha* also has *Katu Rasa* and *Vipaka, Ushna* and *Snigdha Guna, Deepaniya* and *Shoola Prashamana* properties, which helps to protect and cure the liver disorders.

Hepatoprotective activity of *Cinnamomum zeylanicum* (Daalchini)

Katu, Tikta, Madhura Rasa, Laghu, Ruksha and *Teekshna Guna, Katu Vipaka* and *Ushna Veerya* of *Daalchini* help to cure the different liver disorders. A research conducted to evaluate the hepatoprotective activity of cinnamon (*C. zeylanicum*) ethanolic extract against CCl_4 induced hepatic injury in rats showed that, upon administration of ethanolic plant extract for 28 days, there is a significant reduction in CCl_4 toxicity on serum marker of liver damage, ALT, ALP etc. and increase in SOD and catalase enzymes. Histopathological studies also support that cinnamon extract markedly reduced the toxicity of CCl_4 and preserved the histoarchitecture of liver tissue to normal. [28]

Hepatoprotective activity of *Plumbago zeylanica* (Chitraka)

Chitraka has *Katu paka, Agnideepana, Paachana, Ushna, Shothahara, Kapha-Vatanaashaka* and *Graahi* properties, which helps to treat the liver diseases. In a research conducted to evaluate the hepatoprotective effect of *P. zeylanica* in paracetamol (PCM) induced liver toxicity in rats, several phytoconstituents viz. triterpenes, sterols, zeylonone of *P. zeylanica* were found effective

in hepatoprotection. Histological profile of control animals also showed hepatoprotective action of ether root extract of *P. zeylanica* in PCM induced liver injury in rats. [29]

Hepatoprotective activity of *Mesua ferrea* L. (Naagkeshara)

Naagkeshara, has *Kashaya* and *Tikta Rasa, Laghu* and *Ruksha Guna, Ushna Veerya* and *Katu Vipaka* and *Agnivardhaka* property, which helps to balance the *Tridosha* and to treat the liver diseases. Hepatoprotective activity of Mesuol isolated from *M. ferrea* was studied against paracetamol induced hepatotoxicity in rats. Serum parameters like SGOT, SGPT, ALP, TB, DB, Serum total proteins (STP) and the oxidative stress parameters like lipid peroxidation (LPO), reduced glutathione (GSH), total thiols (TT) and histopathological changes of liver were assessed in control, toxicant, standard and drug treated animals groups. There treatment with mesuol to PCM treated animals showed significant increase in the level of GSH and reduction in the level of LPO and significantly increased in the level of TT and GSH as compared with PCM alone treatment group. This study concluded that mesuol has the potential to protect the hepatocytes. [30]

Hepatoprotective activity of *Cinnamomum tamala* (Tejpatra)

The methanolic extract of *C. tamala* leaves showed hepatoprotective activity against PCM induced hepatic damage in swiss albino mice. The liver marker enzymes SGOT, SGPT, ALP, Serum bilirubin and other metabolic parameters total cholesterol, HDL were evaluated in all the experimental groups. The histopathological study of liver also evidence for hepatoprotective activity of *C. tamala* by showing improved architecture of liver cells in the treatment group. [31] And *Katu, Tikta* and *Madhura Rasa, Laghu, Ruksha* and *Teekshna Guna* and *Katu Vipaka* helps to prevent and cure the liver.

Hepatoprotective activity of *Elettaria cardamomum* (Cardamom, Ella)

Ella has *Katu* and *Madhura Rasa, Laghu* and *Ruksha Guna* and *Kshayahara* property, which helps to treat the liver diseases. A study conducted on albino rats to evaluate the hepato-protective effect of aqueous extract of cardamom against gentamicin induced acute hepatic damage, showed that oral administration of aqueous extract of cardamom produces significant reduction in the elevated serum levels of AST, ALT, bilirubin, cholesterol, triglycerides and LDL cholesterol and significant increase in the lower serum levels of albumin and HDL cholesterol in gentamicin induced hepatotoxicity in rats. Another study was done by *Nimmy chacko* on albino wistar rats to evaluate its hepatoprotective activity against PCM induced hepatotoxicity and it showed significant hepatoprotective activity. [32, 33]

Hepatoprotective activity of Copper ash (*Tamra bhasma*)

As per the classical *Rasa granthas*, *Tamra bhasma* is indicated for *Yakrita* disorders. It having the *Tikta-Kashaya Rasa, Ushna Virya, Katu Vipaka, Deepana, Kaphapittahara, Shothahara* and

Virechaka property, it can balance the all three *doshas* and thus prevent and cure the liver disorders. [34, 35] A research conducted to assessed the hepato-protective activity of *Somanathi Tamra Bhasma* in PCM induced liver toxicity in albino rats, based on ponderal, biochemical and histo-pathological parameters, showed significant reduction and protection against PCM induced hepatotoxicity. [36]

Hepatoprotective activity of Silver ash (*Rajata bhasma*)

Rajata bhasma having the *Kashaya* and *Amla Rasa*, *Snigdha*, *Sara*, *Guru Guna*, *Sheeta Virya* and properties of *Ajeerna-nashana*, *Agnimandhyahara*, *Balya*, *Rasayana*, *Pleehodaranashaka*, *Vayasthapana*, helps to prevent and treat the liver diseases. [34-37]

Hepatoprotective activity of *Aconitum ferox* (*Vatsnabha*)

Vatsnabha having the *Katu*, *Tikta*, *Kashaya Rasa* and *Ruksha*, *Teekshna*, *Laghu*, *Vyavayi*, *Vikasi*, *Yogavahi Guna*, helps to balance all the three *Doshas* and enhances the properties of other drugs. Its *rasayana* property further helps to rejuvenate the liver. [38]

Hepatoprotective property of *Rasasindoor* and *Hingula*

Rasasindoor and *Hingula*, both have mostly the same properties, i.e. *Rasa Tikta-Katu-Kashaya*, *Ushna Virya* and other properties like *Agnimandhyahara*, *Pittavirechaka*, *Kaphapittahara*, *Pleehaghna*, *Kamalahara*, *Pachaka*, *Balya* and *Agnivardhaka*, which helps to prevent and cure the liver disorders. [39 - 41]

DISCUSSION

The term liver disease in itself includes many kind of illnesses like cirrhosis, hepatitis, fatty liver, jaundice, gallstone, Wilson's disease, hepatic encephalopathy and many others which affect the liver directly. In all such diseases, all the three *Doshas* are involved, although the *Pitta* and *Kapha* are the main ones. In *Visharasayana*, most of the contents have the *Tikta*, *Katu*, *Kashaya Rasa*; *Ushna Veerya*; *Laghu*, *Ruksha* and *Tikshna* property; and antimicrobial, anti-inflammatory, immunomodulatory, antioxidant, analgesic and anti hyperlipidemic activities, which helps to balance the *Kapha* and *Pitta Dosh* that are in fact mainly involved in the pathophysiology of different liver diseases on different levels. This formulation also contains *Vatsanabha*, which although a poison, but as per the principles of *Ayurveda* acts as a nectar in therapeutic doses. *Vatsanabha*, due to its *Yogavahi* property further enhances the quality (*Guna*) of other companion drugs, and due to its *Rasayana* property helps to prevent and rejuvenate the liver. Researches done on most of the individual drugs of *Visharasayana* on hepato-toxicity in different model animals, clearly demonstrate their individual hepatoprotective activity.

CONCLUSION

On the basis of the pharmacological properties of the component drugs of the *Visharasayana* mentioned in *Ayurvedic* texts and various scientific researches it can be concluded that *Visharasayana* possesses hepatoprotective activity. This collective knowledge will

help the researchers to further explore the knowledge and conduct different researches to prove its efficacy in present era.

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