



## DEMAND OF HERBAL HEPATOPROTECTIVE FORMULATIONS IN LUCKNOW - A SURVEY

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### ABSTRACT

The present investigation was aimed at studying the herbal hepatoprotective formulations, which are used to treat acute and chronic hepatic disorders in the population of Lucknow, Uttar Pradesh. The commercial preparations and their components, and dosage thereof widely used as liver protectives were compiled. The study was initiated from primary data collection through the convenient sampling.

It was found that 70 % of patients suffering from liver disorders belonging to the age group of 25 to 40 years preferred herbal formulations as compared to allopathic drugs. The main ingredients used in these formulations were *Eclipta alba* (bhringraj), *Andrographis paniculata* (kalmegh), *Boerhaavia diffusa* (punarnava), *Picrorhiza kurroa* (kutaki), *Cichorium intybus* (kasani), *Phyllanthus niruri* (Bhumyamalaki), *Tephrosia purpurea* (Sharpunkha), *Zingiber officinale* (Shunthi) etc. and it was found that the amount of bhringraj is more than other ingredients. Most of the preparations are formulated as liquid dosage forms. The major companies, which are involved in manufacture of these herbal formulations, are Himalaya Drug Company, Charak Pharmaceuticals Pvt.Ltd., Dabur India Ltd., etc. The reported side effects of these herbal formulations were found to be negligible.

**Keywords:** herbal, hepatoprotective, marketed products, constituents.

### INTRODUCTION

According to early Vedic literature, Ayurveda was supposedly first passed on by Lord Brahma to sage Bhardwaja. Bhardwaja in turn taught it to other sages like Punarvasu Atreya. He taught ayurveda to his 6 disciples namely, Agnivesha, Bhela, Jatukarana, Prasara, Harita, and Kshara Pani. These disciples, on the basis of their knowledge of the subject, composed their works and blessed the authors. The treatises became popular and proved helpful in mitigating the human sufferings.

The liver is the largest glandular organ in the body, and has more functions than any other human organ. The liver has a pivotal role in human metabolism. It produces and secretes bile (to be stored in the gall bladder until needed) that is used to break down and digest fatty acids. It produces prothrombin and fibrinogen, both blood clotting factors, and heparin, a mucopolysaccharide sulphuric acid ester that helps keep blood from clotting within the circulatory system. The liver converts sugar into glycogen, which it stores until the muscles need energy and it is secreted into the blood stream as glucose. The liver synthesizes proteins and cholesterol and converts carbohydrates and proteins into fats, which are stored for later use. It produces

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blood protein and hundreds of enzymes needed for digestion and other body functions. The liver also produces urea while breaking down proteins, which it synthesizes from carbon dioxide and ammonia. The liver is responsible for detoxifying the body of poisonous substances by transforming and removing toxins and wastes. These toxins and wastes are converted into less harmful substances by the liver and then eliminated from the body.

Because of the significant role the liver plays in maintaining one's health, it must function properly. Symptoms of "sluggish liver" are fatigue, general malaise, digestive problems, blood sugar relation disorders (such as hypoglycemia), high cholesterol psoriasis, allergies and chemical sensitivities and constipation. Extreme cases of liver problems would be jaundice, hepatitis and cirrhosis.

In this article data was collected and valuable information gathered about the herbal formulations most in demand in Lucknow. These formulations were studied for their active constituents, which were hepatoprotective in nature.

A study was also undertaken to find out whether ayurvedic hepatoprotective formulations are more popular than allopathic formulations.

### COMPARISON OF DIFFERENT DOSAGE FORMS

Liquid dosage forms are mostly used as herbal hepatoprotective formulation. It is the dosage form of choice because of better patient acceptability, and pleasant taste.

### MAJOR HERBAL DRUGS AS HEPATOPROTECTIVES

After the survey of data of several products it was concluded that *Eclipta alba* (bhringraj) is the most important herbal drug that is used in hepatoprotective herbal formulations. Frequency and amount of bhringraj is more than the other total 61 active ingredients. Formulation H contains largest quantity of herbal constituents as compare to others. A total of 61 ingredients were used in different types of hepatoprotective herbal formulations recorded in the present study and based on the frequency, the important ones among them are *Eclipta alba* (bhringraj), *Cichorium intybus* (kasani), *Andrographis paniculata* (kalmegh), *Boerhaavia diffusa* (punarnava), *Picrorhiza kurroa* (kutaki), *Tephrosia purpurea* (sarpunkha), *Zingiber officinale* (shunthi), and *Phyllanthus amaris* (bhumyamlaki). Of the total twenty two formulations surveyed, *Eclipta alba* (bhringraj) was present in 16 hepatoprotective herbal formulations. Formulation H contains 750 mg of bhringraj and 600 mg of kasani per 10 ml of dose which was the highest amongst all other formulations.

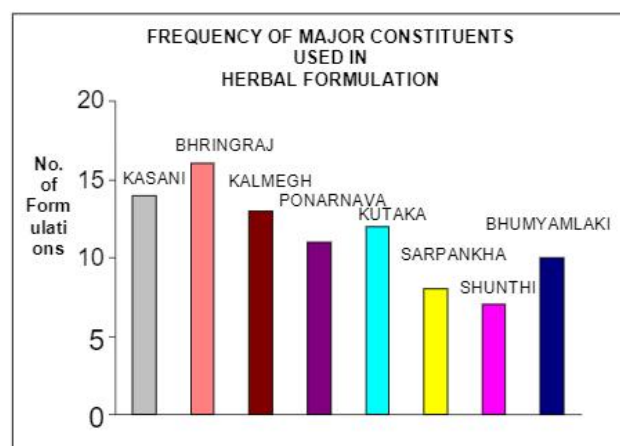


Fig.1

CODE OF PRODUCT*	Qty .in each	The Pharma Research Year: 2009, Vol: 01																			
		C o m p o s I t I o n (mg)																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Formulation A	10 ml	106	106	212	53	27	106	213		106	80	27	27	53	53						
Formulation B	10ml	100	80	100		50		100					100			100	50	80	80	100	100
Formulation C	5ml	100		150		50		150	150						150	50					
Formulation D	5 ml		290	290		175	290	290	290		290										
Formulation E	5 ml	30		100			30	60									30				
Formulation F	1 tab	65	32											16							
Formulation G	1 tab																				
Formulation H	10 ml	600		750			100								200	150			100		100
Formulation I	5 ml	25	25					25					25								
Formulation J	5 ml	450		450		50	50		450						100	100					
Formulation K	5 ml	60		100		20	20	20	60		24										24
Formulation L	1 cap.			250		80	250														
Formulation M	5 ml			30		30	30		60		5						5				
Formulation N	10 ml			20		20	200		100		40		20								
Formulation O	1 tab.	30		50		10	10	10	50		12										12
Formulation P	5 ml	30																			
Formulation Q	10 ml										50						50				
Formulation R	10 ml																50				
Formulation S	5 ml			150																	
Formulation T	1 tab.	187		125		7.5	7.5	187	37												37
Formulation U	5 ml	75		50			3	75					75								
Formulation V	400mg	400		400		200	400	300			400										

CODE OF PRODUCT*	Qty in each	C o m p o s i t i o n (mg)																			
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Formulation A	10 ml							79													
Formulation B	10ml	100					100														
Formulation C	5ml		150	100	100	50			50												
Formulation D	5 ml									290	290						290				
Formulation E	5 ml		30														200				
Formulation F	1 tab	32																			
Formulation G	1 tab						22		22												
Formulation H	10 ml	35		20			150					200	450					200		100	
Formulation I	5 ml	50			25				10							25					
Formulation J	5 ml	300	300									450	450	300	100	100	450				
Formulation K	5 ml																100	100			
Formulation L	1 cap.																250				
Formulation M	5 ml		10														90				
Formulation N	10 ml										20								200	40	40
Formulation O	1 tab.											5					50	50			
Formulation P	5 ml	8	17															17			
Formulation Q	10 ml			50	50				50												
Formulation R	10 ml			50	50				50												
Formulation S	5 ml		75									100									
Formulation T	1 tab.				25				87								250				
Formulation U	5 ml				10				35								100				
Formulation V	400mg		500														500				



CODE OF PRODUCT*	Qty .in each	C o m p o s i t I o n (mg)																			
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Formulation A	10 ml																				
Formulation B	10ml																				
Formulation C	5ml																				
Formulation D	5 ml																				
Formulation E	5 ml												33								
Formulation F	1 tab										65				16						
Formulation G	1 tab				22										65	32	32	19			
Formulation H	10 ml																			70	
Formulation I	5 ml				60	50	50	50	50	50	25										
Formulation J	5 ml																				
Formulation K	5 ml																				
Formulation L	1 cap.																				
Formulation M	5 ml																				
Formulation N	10 ml	40	20	20																	
Formulation O	1 tab.																				
Formulation P	5 ml											17	17								17
Formulation Q	10 ml																				
Formulation R	10 ml																				
Formulation S	5 ml			75																	
Formulation T	1 tab.	125			225																
Formulation U	5 ml	50			90																
Formulation V	400mg																				

### IMPORTANT HEPATOPROTECTIVE HERBAL PLANTS

COMMON NAME	BOTANICAL NAME	FAMILY	PART USED	DISTRIBUTION
Kasamard	<i>Cassia occidentalis</i>	Caesalpinaceae	Whole plant	Throughout India, growing abundantly on waste lands
Kasani	<i>Cichorium intybus</i>	Asteraceae	Whole plant	Cultivated throughout India
Kakamachi	<i>Solanum nigrum</i>	Solanaceae	Whole plant	Throughout dry parts of India
Katuki	<i>Picrorhiza scrophulariflora</i>	Scrophulariaceae	Dried rhizomes	In the Himalayas from Kashmir to Sikkim
Amrita	<i>Tinospora cordifolia</i>	Menispermaceae	Stem	Through India in forest
Arjuna	<i>Terminalia arjuna</i>	Combretaceae	Bark	Through India
Aswangdha	<i>Withania somnifera</i>	Solanaceae	Root, leaves	Throughout drier parts of India
Amalaki	<i>Emblica officinalis</i>	Euphorbiaceae	Root, bark, leaves & fruits	Throughout India in deciduous forests & on hill slopes up to 200 m
Parpoti	<i>Zanonia indica</i>	Cucurbitaceae	Leaves, fruits	Throughout India in forests
Punarnava	<i>Boerhavia diffusa</i>	Nyctaginaceae	Whole plant	Throughout in India as weeds.
Hanspadi	<i>Desmodium triflorum</i>	Fabaceae	Whole plant	Throughout in India as weeds.
Haritaki	<i>Terminalia chebula</i>	Combretaceae	Fruits	Through India in deciduous forest.
Haridra	<i>Curcuma longa</i>	Zingiberaceae	Rhizomes	Throughout India cultivated
Kalmegh	<i>Andrographis paniculata</i>	Acanthaceae	Whole plant	Throughout India in plains, also in forest
Kurchi	<i>Halorhenna pubescens</i>	Apocynaceae	Bark, seed, leaves	Throughout India in deciduous forests up to 900 m
Chirata	<i>Swertia chirayita</i>	Gentianaceae	Whole plant	In the Temperate Himalayas, especially in Nepal
Papaya	<i>Carica papaya</i>	Curicaceae	Latex, fruits	Throughout India cultivated
Daruharidra	<i>Coscinum fenestratum</i>	Menispermaceae	Stem	Western ghats, in Tamilnadu & Kerala
Dhaniya	<i>Coriandrum sativum</i>	Umbelliferae	Leaves, fruits	Cultivated

				throughout India
Samph	<i>Foeniculum vulgare</i>	Apiaceae	Fruits	Cultivated throughout India
Gulab	<i>Rosa centifolia</i>	Rosaceae	Leaves, root & flower	Cultivated throughout India
Gokharu	<i>Tribulus terrestris</i>	Zygophyllaceae	Whole plant	Throughout India up to 5-400 m as weed
Makkay	<i>Ziziphus oenoplia</i>	Rhamnaceae	Roots	Throughout India in dry forests and open bushy places
Parpata	<i>Hedyotis corymbosa</i>	Rubiaceae	Whole plant	Throughout India , as weeds
Pudina	<i>Mentha arvensis</i>	Lamiaceae	Leaves	Western Himalayas, also cultivated throughout India
Pan	<i>Piper betel</i>	Piperaceae	Whole plant	Cultivated in hotter and damper parts of India
Rohitak	<i>Aphanamixis polystachya</i>	Meliaceae	Bark, seeds	Throughout India in ever green forest
Jhak	<i>Salvadorapursica</i>	Salvdoraceae	Bark, leaves, shoots, fruits	On saline lands, black cotton soil of peninsular India & Srilanka
Jav	<i>Hordeum vulgare</i>	Poaceae	Grains	Throughout India cultivated
Vibhitaka	<i>Terminalia bellirica</i>	Combentaceae	Bark, fruits	Throughout India, in deciduous forests up to 900 m
Vidanga	<i>Embelica ribes</i>	Myrsinaceae	Root, leaves & fruits	Up to 1500 m elevation in hilly regions
Vasaka	<i>Adhatada vasika</i>	Acanthaceae	Leaves, root, flower, stem bark	Throughout up to an altitude of 1300 m
Prativisha	<i>Aconitum bisma</i>	Ranunculaceae	Roots	In the Alpine Himalayas of Sikkim, Nepal & adjoining part of Southern Tibet.
Maricha	<i>Piper nigrum</i>	Piperaceae	Dried fruits	Native to Malabar in western coast of India
Revandchini	<i>Rheum webbianum</i>	Polygonaceae	Roots	In the mountains &

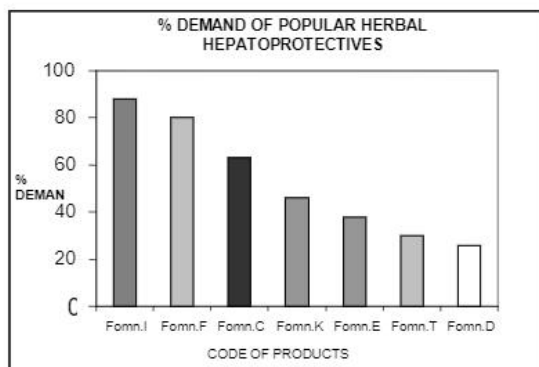
				desert region of the Qinghai-Tibetan plateau & adjacent area
Bhringraj	Eclipta alba	Asteraceae	Leaves & roots	It grows commonly in moist places as a weed all over the plains of India
Chitrak	Plumbago xeylanica	Plumbaginaceae	Roots	Native to Southern Asia
Tulsi	Ocimum sactum	Lamiaceae	Whole plant	Throughout India, near cultivated fields, gardens & waste lands
Shunthi	Zingiber officinale	Zingiberaceae	Rhizomes	Native to China, India & Mexico
Sharphunkha	Tephrosia purpurea	Fabaceae	Root , leaves, seed & bark	Grows as common waste lands, cultivated as green manure crop
Himsra	Capparis spinosa	Capparidaceae	Root bark	
Bathwa seed	Chenopodium album	Chenopodiaceae	Leaves	Throughout India
Balchar	Nordostachys	Valertianaceae	Rhizomes	In Indiagrows in steep areas, moist & rocky slopes

#### POPULAR HERBAL HEPATO-PROTECTIVE PRODUCTS

Most popular hepatoprotective herbal formulation in-prescription and non-prescription categories in Lucknow. Other important herbal formulations are formulation F, formulation C, formulation K etc. About 87.5 % pharmacists of medical stores said that formulation I is the best

selling hepatoprotective formulation; other formulations which are popular are shown in Fig.2. There are about a total of 61 active ingredients in varying amount, in different herbal formulations. Formulation H contains the largest quantity of important ingredients. Most of the preparations are present in liquid dosage form.





**Fig.2:** % DEMAND OF POPULAR HERBAL HEPATO-PROTECTIVES

## IMPORTANT HERBAL HEPATO-PROTECTIVES

### **Andrographis paniculata (Kalmegh)**

Andrographolide, the active constituent isolated from the plant *Andrographis paniculata*, showed a significant dose dependent protective activity against paracetamol-induced toxicity on ex vivo preparation of isolated rat hepatocytes. It significantly increased the percent viability of the hepatocytes as tested by tryptan blue exclusion and oxygen uptake tests. It completely antagonized the toxic effects of paracetamol on certain enzymes (GOT, GPT and alkaline phosphates) in serum as well as in isolated hepatic cells. Andrographolide was found to be more potent than silymarin, a standard hepatoprotective agent.<sup>1</sup>

### **Boerhavia diffusa (Punarnava)**

An alcoholic extract of whole plant *Boerhavia diffusa* given orally exhibited hepatoprotective activity against experimentally induced carbon tetrachloride hepatotoxicity in rats and mice. The extract also produced an increase in normal bile flow in rats suggesting a strong choleric activity. The extract does not show any signs of toxicity up to an oral dose of 2g/kg in mice.<sup>2</sup>

### **Eclipta alba (Bhringraj)**

The hepatoprotective effect of the ethanol/water (1:1) extract of *Eclipta alba* was studied at subcellular levels in rats against (CCl<sub>4</sub>) -induced hepatotoxicity. The loss of hepatic lysosomal acid phosphatase and alkaline phosphatase by (CCl<sub>4</sub>) was significantly restored by Ea. Hepatoprotective activity of Ea is by regulating the levels of hepatic microsomal drug metabolizing enzymes.<sup>3</sup>

### **Picrorrhiza kurroa (Katuki)**

*Picrorrhiza Kurroa* is one of the herbs recommend to support the liver not only in everyday situations, but in cases where severe viral infections exists: a study by Vaidya et al found protection against viral hepatitis, and other studies have demonstrated its helpfulness in protecting against alcohol.<sup>4</sup>

### **Cichorium intybus (Kasani)**

It is a popular ayurvedic remedy for the treatment of liver diseases. It is commonly known as kasani and it is a part of polyherbal formulations used in the treatment of liver diseases. Optimum properties were seen with a dose of 75 mg/kg given 30 min after CCl<sub>4</sub> intoxication. In preclinical studies its alcoholic extract was found to be effective against chlorpromazine induced intoxication.<sup>5</sup>

### **Tephrosia purpurea (Sharpunkha)**

Alkaline preparation of *Tephrosia purpurea* is used in treatment of liver and spleen diseases. It is protective against CCl<sub>4</sub> and D-galactosamine poisoning.<sup>6</sup>

### **Zingiber officinale (Shunthi)**

It is used as antiemetic. Its adsorbent aromatic and carminative properties on entero-intestinal tract causes adsorption of toxins and acids enhanced gastric motility.<sup>6</sup>

### **Phyllanthus amaris (Bhumyamlaki)**

Main application of Bhumyamlaki is in viral infection of the liver, specifically Hepatitis B. Thyagaran et al. reported that of 22 –37 cases of hepatitis B were cured after using the herb for a month.<sup>7</sup>

### **FUTURE SCOPE**

Herbal medicines are now in great demand in the developing world for primary health care not because they are inexpensive but also for better cultural acceptability, better compatibility, with the human body and minimal side effects. Global acceptance of Ayurveda is gearing up there has been a steep rise in the demand for medicinal plants from India. Presently the United States is the largest market for Indian botanical products accounting for about 50% of the total exports. However recent findings indicate that all herbal medicines may not be safe as severe consequences are reported for some herbal drugs.<sup>8</sup> Globally there have been concerted efforts to monitor quality and regulate the growing business of herbal drugs and traditional medicine. Health authorities and governments of various nations like United States congress, US Food and Drug Administration (FDA) and World Health Organization (WHO) are keen regarding traditional medicine and have been active in creating strategies, guidelines and standards of botanical medicines. WHO, USFDA, European Scientific Cooperative on Phytomedicine (ESCOP), have published standard sets of guidelines to address the concerns.<sup>9</sup> The publication of Indian Herbal Pharmacopoeia and Ayurvedic Pharmacopoeia are a positive step towards the standardization of herbal drugs. Regulatory norms have to be stringent for nutraceutical preparations and herbal drugs so that the variation between similar contents in different formulations may cease and a scientific approach with definite

constituents may be possible for herbals as well.

### **CONCLUSION**

After the data collection and survey of herbal hepatoprotective formulations, it was concluded that various herbal constituents are used as hepatic drugs, bhringraj being the most popular hepatoprotective agent.

- Frequently used constituents for herbal hepatoprotective formulations are Andrographis paniculata, Boerhaavia diffusa, Cichorium intybus, Tephrosia purpurea, Phyllanthus amaris, Zingiber officinale, Picrorrhiza kurroa and Eclipta alba.
- Diseases for which these formulations are mainly used are hepatotoxicosis, liver damage, jaundice, hepatitis and in treatment of loss of appetite.
- It was concluded that liquid dosage forms are most commonly used and shelf life of herbal hepatoprotectives is usually about 3 years.

It was also concluded that herbal formulations are more widely used than allopathic drugs as hepatoprotectives. From study it was concluded that herbal medicine is still the mainstay of about 75-80% for primary health care. The use of herbal remedies throughout the world exceeds that of the conventional drugs by two to three times. The advantages of herbal hepatoprotectives are that they are relatively easier to store and have fewer side effects. These are the reasons that herbal hepatoprotectives are mostly preferred by medical practitioners, as well as over-the-counter.<sup>8</sup>

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