

Role of plants as hepatoprotective agents – a brief review

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ABSTRACT

Medicinal plants have been playing a key role in maintaining human health since ancient times. Liver is a vital organ play a major role in metabolism and excretion of xenobiotics from the body. Liver diseases are among the most serious and are a challenge to modern medical practitioners. Historically, several plants have been utilized for treating a number of liver disorders, particularly chronic hepatitis C and alcohol-induced liver disease. In recent years, researchers have focused on the efficacy of plants used traditionally by indigenous healers and herbalists. Many common liver diseases can cause the organ to become inflamed. This inflammation can progress to scarring or cirrhosis. The review covers the multi-purpose medicinal uses of some plants species which act as hepatoprotective agents. The whole plant and plant parts are being utilized in herbal medications. The herbs have shown a potential of reversing liver damage caused by a number of hepatotoxic compounds.

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KEYWORDS

Hepatoprotective;
Cirrhosis;
Alcoholism;
Silymarin;
Glycyrrhizin.

INTRODUCTION

Medicinal plants play a key role in the human health care system. Around 80% of the world population depends on medicine which is predominantly based on plant materials^[1]. The conventional medicine refers to a broad range of ancient, natural health care practices including folk/tribal practices as well as Ayurveda, Siddha and Unani. It is estimated that around 7,500 plants are useful in traditional health systems, mostly in rural and tribal villages of India. Out of these, the real medicinal value of over 4,000 plants is either little known or unknown^[2].

Historically, herbals have been utilized for a number of liver conditions, particularly chronic

hepatitis C and alcohol-induced liver disease. The phytochemical constituents like silymarin and glycyrrhizin are important in formulation of herbal products in Chinese and other herbal systems^[3]. In the USA, survey has shown that 21% of the population utilized herbal -preparations to treat liver related diseases^[4].

Hepatic disorders

Liver diseases are generally caused by toxic chemicals, excess consumption of alcohol, infections and autoimmune disorder. Most of the hepatotoxic chemicals damage liver cells primarily by lipid peroxidation and other oxidative damages^[5,6]. Structural changes in the liver may cause impairment of

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TABLE 1 : List of plants with hepatoprotective properties

Sr. No.	Name	Botanical Name	Plant Part Used	Chemical Constituents	Uses	Reference
1	Bhringaraja	<i>Eclipta alba</i>	Whole Plant	Alkaloids: ecliptine, Nicotine	Jaundice, enlargement of liver and spleen Antimicrobial, liver disease,	
2	Neem	<i>Azadirachta Indica</i>	Leaf and bark	Triterpenoids, sterols, nimbin and nimbiol	antifungal, antipyretic, antiviral	[20] [21] [22] [23]
3	Doob	<i>Cynodon dactylon</i>	Dried fibrous roots	Phenolic phytotoxin and flavonoids	Jaundice, eye disorders, Antihelmintic	[24] [25]
4	Lauki	<i>Lagenaria siceraria</i>	Fresh fruit	Saponin and fatty Oil	Jaundice, purgative, emetic, bronchitis	[26] [27]
5	Mehandi	<i>Lawsonia inermis</i>	Dried Leaves	Glycoside, lawsone, hennatonic acid	Liver enlargement, antihaemorrhagic, antispasmodic	
6	Kalimusli	<i>Curculigo orchoides</i>	Dried Rhizome	Tannin, resin, sapogenin, alkaloids	Nervine, jaundice Anti-inflammatory,	
7	Aak	<i>Calotropis procera</i>	Dried roots and leaves	Glycosides: calotropin, ascorbic acid	Bitter, pungent, laxative, Skin disease, liver diseases	
8	Giloe	<i>Tinospora Cordifolia</i>	Mature Stem	Terpenoids and Alkaloids	Antipyretic, antiperiodic, Hepatoprotective, liver diseases	
9	Kantkari	<i>Solanum surattense</i>	Dried Whole Plant	Solasonine, quercetin diglycoside	Stimulant, expectorant, diuretic, laxative, bronchitis, liver diseases	[20]
10	Ghritkumari	<i>Aloe barbadensis</i>	Dried juice of leaves	Aloe emodin, aloin, enzymes, vitamins	Dysmenorrhoea, liver diseases, emollient, anti-inflammatory	[21] [22] [23]
11	Punarnava	<i>Boerhaavia diffusa</i>	Whole Plant	Flavonoids, alkaloids, lignins, carbohydrates	Viral jaundice, diuretic, anti-inflammatory, spasmolytic	[24] [25] [26]
12	Thuhar	<i>Euphrobia nerifolia</i>	Stem	Triterpenoids, Euphol	Purgative, diuretic, Polyuria, liver disorder	[27]
13	Bhui amala	<i>Phyllanthus niruri</i>	Root, Stem and leaves	Phyllanthin, Hypophyllanthin	Liver disorders, hepatitis B Virus	
14	Mulethi	<i>Glycyrrhiza glabra</i>	Dried stolon and root	Glycyrrhizin, Glabrolide	Demulcent, expectorant, Hepatoprotective	
15	Madar	<i>Calotropis gigantean</i>	Dried Bark and root	Glycosides, Akudarin	leucoderma, diseases of spleen and liver	
16	Biyani	<i>Tephrosia purpurea</i>	Whole Plant	Rutin and rotenoids	Inflammation of spleen And liver, piles, boils and pimples	[20]
17	Karer	<i>Capparis deciduas</i>	Fruit	Spermidine alkaloids, Glucocapparin	Bitter, diuretic, hepatic, spleen and renal disorders, liver diseases	[21] [22] [23]
18	Rohiro	<i>Tecomella undulate</i>	Fruit	Tecomin, Tecomelloside	Relaxant, cardiotoxic, choleric, diseases of liver and spleen	[24] [25] [26]
19	Harmal	<i>Peganum harmala</i>	Root	Harmine, Harmaline	Relieves pain in liver, jaundice, asthma	[27]
20	Paniharin	<i>Leucas aspera</i>	Leaves	Urosolic acid, oleanolis acid	Jaundice, anorexia, fever, skin diseases	
21	Arjuna	<i>Terminalia arjuna</i>	Dried stem, bark, whole plant	Ellagic acid, β -sitosterol	Anti-ischemic, hypertension, heart disease, cirrhosis	[28]

Sr. No.	Name	Botanical Name	Plant Part Used	Chemical Constituents	Uses	Reference
22	Shatavari	<i>Asparagus racemosus</i>	Dried Root	Saponins, Shatavarin I- IV	Mucilage, Liverdiseases, tumor, inflammation, disease of eye & blood, tuberculosis, leprosy, nervous disorder, night blindness, infectious diseases	[29] [30] [31] [32]
23	Halada	<i>Curcuma longa</i>	Ground rhizome	Volatile oils, Tumerone, Arabinose, Curcumin	Choleretic effect on liver, hepatoprotective, anti- inflammatory	[33] [34] [35] [36] [37]
24	Milk Thistle	<i>Silybum marianum</i>	Leaves	Silymarin, Betaine, Flavonoligans	Anti-inflammatory, hepatoprotective, liver diseases, mushroom poisoning, antifibrotic, antioxidant	[38] [39] [40] [41] [42]
25	Green tea	<i>Camellia sinensis</i>	Leaves, Whole Plant	Caffeine, Epicatechin, Galocatechin	Hepatoprotective activity, antioxidant	[43] [44] [45] [46] [47]
26	Katuka	<i>Picrorrhiza kurroa</i>	Stem	Ktukoside, Apocynin	Antioxidant, Detoxification, Liver diseases	[48] [49] [50] [51]
27	Berberry	<i>Berberis lyceum</i>	Leaves, Root	Berberine, Umbellitine, Tannins	Swollen & sore eyes, jaundice, curative piles, ulcer, broken bones, wounds Asthma, liver diseases abdominal pain, infection,	[52] [53]
28	Licorice	<i>Glycyrrhiza glabra</i>	Leaves	Coumarins, chalcones, phytosterols	antitussive, laxative activity, ulcer, pharyngitis	[54] [55]
29	Kapur kachri	<i>Hedychium spicatum</i>	Whole Plant	Linalool, Camphor, D- sabinene	Nauesa,bronchial asthma,vomiting, Liver diseases Halitosis Nerve sedative, enlargement of	[56]
30	Saffron	<i>Crocus sativus</i>	Leaves	Glycosidecrocin, Lycopene	liver, melancholia, stimulant properties	[57]

hepatic function manifested as jaundice, ascites, hepatorenal syndrome, hepatic encephalopathy, spontaneous bacterial peritonitis^[7-10]. Liver is exposed to drugs in higher concentration as whole of

the drug pass through liver to reach systemic flow^[11]. Alcohol affects many organ systems of the body, particularly the liver. These are fatty liver, hepatitis and cirrhosis. Fatty liver (steatosis), the most com-

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mon alcohol-induced disorder, is distinct by the excessive accumulation of fat inside the liver cells. Alcoholic hepatitis is inflammation and more severe injury of the liver while in cirrhosis; normal liver cells are replaced by scar tissue^[12]. Considering the high level of alcohol consumption in South Africa coupled with the associated effect of liquor especially on the liver of heavy drinkers, there is a need to identify indigenous medicinal plants with hepatoprotective properties, document information on them as well as the ingredients that bring relief and possible toxic implications of these plants^[13].

Causes of hepatic diseases

- Long term alcohol consumption
- Hemochromatosis (an inherited disorder that causes the body to absorb and store too much iron)
- Malnutrition
- Autoimmune diseases
- Exposure to toxins through ingestion, inhalation or skin absorption
- Hereditary conditions
- Long term use of certain medication
- Undergoing abdominal surgery that results in rapid weight loss

Plant with hepatoprotective properties

Liver disease is a worldwide problem. Conventional drugs used in the treatment of liver diseases are sometimes inadequate and can have serious adverse effects^[7-10]. Treatment options for common liver diseases such as cirrhosis, fatty liver, and chronic hepatitis are problematic. The efficiency of treatments such as interferon, colchicine, penicillamine, and corticosteroids are inconsistent at best and the incidence of side-effects profound^[14-15]. Conservative physicians often counsel watchful waiting for many of their patients, waiting in fact for the time when the disease has progressed to the point that warrants the use of heroic measures. Physicians and patients are in need of effective therapeutic agents with a low incidence of side-effects. Liver is the most important organ where drugs are structurally altered resulting in biologically inactive or active metabolites and some of these are toxic^[16].

Many plants potentially constitute such a group of phytochemicals which act as therapeutic agents for liver disorders. Silymarin was the most reported

herb used (12%), followed by garlic (8%), ginseng (6%), green tea (5%), ginkgo (5%), echinacea (5%), and St. John's wort (4%), licorice root (1%)^[17]. Herbal drugs were utilized as juice, latex or in dried powder form^[18]. Liver protective herbal drugs contain a variety of chemical constituents like phenols, coumarins, lignins, essential oils, monoterpenes, crotonoids, glycosides, flavanoids, organic acids, lipids, alkaloids and xanthines. Plant extracts in the form of crude drugs are also used for the treatment of liver disorders^[19]. Such plants have been enumerated in TABLE 1.

CONCLUSION

Hepatic disorders have become a major cause of human deaths in recent times and are a challenge to medical practitioners. Modern medicine, though effective to some extent have exhibited negative side effects. Crude drug derived from some plants have offered better alternative therapy as practised in the past. Refining such crude drugs to develop more effective treatment is required by doctors and researchers.

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