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CURRENT STATUS OF HEPATOPROTECTIVE MEDICINAL PLANTS: NATURAL PRODUCTS USED IN HEPATOPROTECTIVE REMEDIES IN TRADITIONAL MEDICINE

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ABSTRACT

All plants have a potential medicinal value and have been considered as vital helpful guide for lightening illness of humankind. Herbal plants or medicines have been utilized traditionally by herbalist worldwide for the prevention and treatment of liver disease. Medicinal plants assume a key part in human health care. Around 80% of the total populace depends on the utilization of traditional medicine, which is dominatingly in view of plant material.

A long running drug therapy, environmental pollutants, hepatic disease and alcoholic intoxicants are the fundamental driver of liver disorders. Notwithstanding reliable human exertion and drug discovery, present day drug has almost no to offer. Different Ayurveda and Unani herbal drugs are utilized to cure liver diseases. The herbal drugs utilized as hepatoprotectives in Ayurvedic system of medicine and the Ayurvedic formulations employed to cure liver disorders.

Liver disease, also called hepatic disease is any condition that may cause unsettling influence of liver function and causes illness. The liver is in-charge of numerous indispensable capacities inside the body and should it wind up diseased or harmed, the loss of those capacities can make huge harm the body. Common items which are gotten from plant removes, herbs, creatures, marine and microorganisms are utilized traditionally for treatment of liver infirmities. Over half of the drugs available are as yet in view of normal items. This survey is on characteristic items from plants, marine and microbiological hotspots for the treatment of liver diseases. This work expects to help analysts in the investigation of common items valuable in lightening liver disorders.

The present paper discusses different types of medicinal plants containing hepatoprotective activity.

KEYWORDS: Herbs, Natural Products, Liver Disorder, Hepatoprotectives, Medicinal Plants, Traditional Medicine.

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INTRODUCTION

It is assessed that 7,500 plants are utilized as a part of nearby health conventions in, for the most part, rustic and ancestral towns of India. Out of these, the genuine medicinal value of more than 4,000 plants is either minimal known or up to this point obscure to the standard populace. The traditional systems of medicine, for example, Ayurveda, Siddha, Amchi, Unani and Tibetan use around 1,200 plants. A point by point examination and documentation of plants utilized as a part of nearby health customs and pharmacological assessment of these plants and their taxonomical relatives can prompt the advancement of precious plant drugs for some feared diseases (Singh et al., 2012; Kshirsagar et al., 2011). Random screening of plants has not demonstrated monetarily compelling. Liver is an indispensable organ assumes a noteworthy part in digestion and discharge of xenobiotics from the body. Liver damage or liver brokenness is a noteworthy health issues that difficulties healthcare professionals as well as the pharmaceutical business and drug administrative offices. Liver cell damage caused by different poisonous synthetic compounds like certainanti-biotic, chemotherapeutic specialists, carbon tetrachloride (CCl4), thioacetamide (TAA) and so on, unnecessary liquor utilization and organisms is all around examined. The accessible manufactured drugs to treat liver disorders in this condition additionally make additionally harm the liver. Consequently, Herbal drugs have turned out to be progressively mainstream and their utilization is across the board. Herbal medicines have been utilized as a part of the treatment of liver diseases for quite a while. Different herbal arrangements are accessible in the market. The present audit is gone for arranging information on promising phytochemicals from medicinal plants that have been tried in hepato poisonous quality models utilizing current logical system. Medicinal plants assume a key part in the human health care. Around 80% of the total populace depends on the utilization of traditional medicine which is prevalently in view of plant materials like Annona squamosa (Rahiman and Kumar, 2011), Apium graeolens Linn (Patil Prakash, 2011), Coptidis Rhizoma (Huanglian) (Merlin and Parthasarathy, 2011), Careya arborea: (Babalola, 2011), Cassia fistula (Amaltas) (Mohammad, 2010), Cleome thick Linn (Tickweed) (Rajeswari and Vasuki, 2011), Fumaria indica (Patil, 2011), Leucas Aspera (Patil and Imtiaz, 2011), Leucas ciliata leaves: (Deore and Vinayak, 2011), Juncus subulatus (Balakrishanan and Balasubaramaniam, 2011), Mamordica subangulata and Naragamia alata: (Nithianantham and Shyamala, 2011), Morinda citrifolia (noni) (Nayak and Marshall, 2011), Phyllanthus amarus (Bhuiamala) (Mohamed and Hassan, 2011), Prostechea michuacana (Subash and Ramesh, 2011), Plumbago zeylanica: (Suryawanshi and Khakre, 2011), Sargassum polycystum (Kumar and Phaneendra, 2011), Spermacoce hispida (Pattanayak and Nayak, 2011) and Wedelia calendulacea (Bhanra) (Akinloye and Moshood, 2011). The traditional medicine alludes to an expansive scope of old regular health care works on including people/inborn practices and also Ayurveda, Siddha and Unani. These medicinal practices started from time immemorial and grew slowly, to an expansive degree, by depending or in light of handy encounters without critical references to current logical standards (Srinivas and Kumar, 2011; Singh et al., 2012).

HEPATOPROTECTIVE HERBS

Herbal-based therapeutics for liver disorders has been being used in India for quite a while and has been promoted world over by driving pharmaceuticals. In spite of the noteworthy fame of a few herbal medicines when all is said in done, and for liver diseases specifically, they are as yet inadmissible treatment modalities for liver diseases. The constraining elements that add to this consequence are:

a) Lack of standardization of the herbal drugs
b) Lack of distinguishing proof of dynamic ingredient(s)/principles(s)
c) Lack of randomized controlled clinical preliminaries (RCTs)
d) Lack of toxicological assessment

The utilization of regular solutions for the treatment of liver diseases has long history, beginning with the Ayurvedic treatment, and stretching out to the Chinese, European and different systems of traditional medicines. The 21st century has seen a change in outlook towards remedial assessment of herbal items in liver disease models via carefully synergizing the qualities of the traditional systems of medicine with that of the advanced idea of proof based medicinal assessment, standardization and randomized fake treatment controlled clinical preliminaries to help clinical viability.

Different plants and details have been asserted to have hepatoprotective movement. Almost 160 phytoconstituents from 101 plants have been asserted to have liver securing action. In India, in excess of 87 plants are utilized as a part of 33 protected and restrictive multi fixing plant definitions. Regardless of the gigantic advances made, no noteworthy and safe hepatoprotective operators are accessible in present day therapeutics. Along these lines, due significance has been offered all around to create plant-based hepatoprotective drugs powerful against an assortment of liver disorders. The present audit is gone for gathering information in view of detailed takes a shot at promising phytochemicals from medicinal plants that have been tried in hepatotoxicity models. The hepatoprotective movement is presumably because of the nearness of flavonoids in every one of the couple of herbal plants. The consequences of this investigation show that concentrates of leaves and plants concentrates of some medicinal plant have great potentials for use in hepatic disease. The present audit consider give evidential investigate instrument of activity of medicinal plants against tentatively prompted hepatotoxicity. Consequently the audit examine is presumed that the herbal drug has hepatoprotective movement and it has been demonstrated by various creature models give numerous connects to build up the future preliminaries (Venkatesh, 2011).

LIVER DISEASES

Liver, the most vital organ of human body engaged with digestion, union, discharge and detoxification of different endogenous and exogenous substances, for example, drugs. Such physiological action of the liver outcomes in the creation of very responsive species known as free radicals. These highly unstable free radicals combine with the membrane lipids by covalent bond results in the alteration of membrane permeability of hepatic cells leading to tissue damage (Kohen, and Nyska. 2002). Liver disease afflicts over 10% of the world population. This constitutes hepatitis, cirrhosis, fibrosis, hepatic steatosis (fatty liver) alcoholic liver disease and drug induced liver disease (Zhang, et al., 2013). Morbidity and mortality resulting from liver diseases is a major public health problem worldwide especially in developing countries. The management of liver disease is still a challenge to modern medicine as there is no effective drug available that stimulates liver function, offer protection to the liver from damage or help to regenerate hepatic cells. The only drugs available are Corticosteroids and Immunosuppressive agents. However, these suffer with several adverse effects. It is therefore necessary to search for alternative drugs for the treatment of liver diseases to replace currently used drugs of doubtful efficacy and safety (Adewusi, and Afolayan. 2010). In the present day scenario, nearly half of the agents used in liver diseases are either natural products or derivatives of natural products due to their ability to act on various biological targets, so there remains a great

interest in the search for natural products from plants, terrestrial and marine animals and microorganisms as potential drug chemical leads for the treatment of a liver disease. Among the wide range of natural sources, herbal source play a key role, where 65% of patients in US and Europe depend on herbal preparations for the treatment of liver diseases (Zhang, et al., 2013). The aim of the present review is to summarize the available experimental findings regarding natural sources (herbal, marine and microbiological) used to treat liver diseases and their underlying mechanism.

HERBAL MEDICINES FOR THE TREATMENT OF LIVER DISEASES

Herbal medicines have been utilized to treat liver disorders for thousands of years and have now turned into a promising therapy for different obsessive liver conditions. In India, more than 40 polyherbal business definitions answered to have hepatoprotective activity are being utilized alongside 160 phytoconstituents from 101 plant families (Handa, et al., 1986; Sharma, et al., 1991). A rundown of plants answered to have critical hepatoprotective movement is appeared in Table 1 in order request of the plant logical name together with the piece of the plant utilized, sort of concentrate utilized or compound disconnected, including model, kind of test and component of activity included. The hepatoprotective action of Artemisia capillaris watery concentrate against bile pipe ligation instigated liver harm. The hoisted serum protein levels and cell reinforcement parameters were reestablished by the concentrate. The concentrate additionally lessened the levels of alpha smooth muscle activity (α-SMA) because of bile channel ligation (Han, et al., 2013). Artemisia capillaris can be utilized as hostile to hepato fibrotic cure, particularly in chloestatic liver issue and the mindful system may include the control of oxidative pressure related compounds and fibrogenic cytokines. The constituents distinguished in the fluid concentrate are 3,4,5-cafeoyl quinic corrosive and quercetin. Eugenia jambolana (Jamun) is a berry organic product, utilized as a part of traditional medicine, for example, Ayurveda for different illnesses. Anthocyanin subordinates introduce in jamun natural product separate presumably evoke hepatoprotective movement through lessening NF-kB flagging, irritation and oxidative pressure, macrophage amassing and lipid peroxidation. The hepatoprotective action via carotenoids in isoniazid-rifampicin initiated hepatic damage in rats has been accounted for (Ajay, et al., 2010, Rana, et al., 2010). Carotenoids successfully hindered the lipid peroxidation and upgraded the counter oxidant catalyst system which might be in charge of its hepatoprotective activity. Hepatoprotective action of Psidium guajava fluid leaf extricates against CCl4, thioacetamide and paracetamol initiated liver damage. In interminable liver damage instigated by CCl4 the P. guajava leaf remove lessened the hoisted serum protein levels (Chanchal, et al., 2006). The hepatoprotective action of the plant might be because of cell reinforcement impact of the plant. The hepatoprotective impact of Cirsium arisanense Kitamura in tacrine treated hepatoma hep 3B cells and C57BL mice. Phenol containing fluid parts of C. arisanense roots displayed higher phenolic substance and cell reinforcement limit than leaves and hepatoprotective activity of roots happens through increment in glutathione levels and end of the nitric oxide creation (Ku et al., 2008).

Table 1.Herbs with their representative extract/single compound tested for prevention of liver diseases

Plant Name (Family)	Part of the plant	Extract/ Compound	Effects	Reference
Acacia auriculiformis (Fabaceae)	Bark and empty pods	70% acetone extract	Antioxidant	(Sathya, and Siddhuraju. 2013)
Acacia confuse (Fabaceae)	Bark	Ethanol extract/Gallic acid	Antioxidant	(Tung, et al., 2009)
Aralia continentalis (Araleaceae)	Root	70% ethanol water extract	Antioxidant	(Hwang, et al., 2009)
Barleria prinotis (Acanthaceae)	Leaves and stems	Ethylacetate extract/iridoid glycosides	Antioxidant	(Singh, et al., 2005)
Camelia oleifera (Theaceae)	Seed	Seed oil	Antioxidant	(Lee, et al., 2007)
Carthamus tictorus (Asteraceae)	Flowers	Carthamus red	Antioxidant	(Shuang et al., 2013)
Dendrobium huoshanense (Orchidaceae)	Stem	Galactoglucomannan	Antioxidant Antifibrinolytic	(Pan, et al., 2012)
Elephantopus scaber (Asteraceae)	Roots	Deoxyelephantopin (sesquiterpene lactone)	Antiinflammation	(Huang, et al., 2013)
Enicostemma axillare (Gentianaceae)	Whole plant	Swertiamarin	Antioxidant	(Jaishree, et al., 2010)
Eucommia ulmoides (Eucommiaceae)	Leaves	Aqueous extract/ protocatechuic acid	Antioxidant	(Hung, et al., 2006)
Fumaria indica (Fumariaceae)	Whole plant	Butanol extract/protopine	Antioxidant	(Rathi, et al., 2008)
Fumaria Parvifolia (Fumariaceae)	Whole plant	50%ethanol extract/fumaricacid and protopine	Anti-apoptotic	(Madhulika, et al., 2010)
Gentiana scabra (Gentianaceae)	Rhizomes	Aqueous extract/polyphenols	Antioxidant	(Ko, et al., 2011)
Indigofera tinctoria (Leguminosae)	Aerial parts	Trans-teracos-15-enoic acid	Antioxidant	(Singh, et al., 2006)
Laggera alata (Asteraceae)	Whole plant	Aqueous extract/isocholorogenic acid	AntihepatitisB	(Hao, et al., 2012)

Launea procumbens (Asteraceae)	Aerial parts	Chloroform extract/phenolic compounds	Antioxidant	(Khan, et al., 2012)
Luffa acutangula (Cucurbitaceae`)	Fruits	Hydroalcoholic extract	Antioxidant	(Jadhav, et al., 2010)
Lycium chinensis (Solanaceae)	Fruits	Aqueous extract	Antioxidant	(Ha, et al., 2005)
Moringa oleifera (Moringceae)	Seeds	Ethanolic extract	Antifibrinolytic Antioxidant	(Hamza. 2010)
Murraya Koenigii (Rutaceae)	Leaves	Aq extract/ carbazole alkaloid and tannins	Antioxidant	(Sathaye, et al., 2011)
Perilla frutscens (Lamiaceae)	Leaves	Aqueous extract/ Caffeic acid, Rosmarinic acid	Antioxidant	(Yang, et al., 2013)
Platycodon grandiflorum (Companulaceae*)*	Root	Aqueous extract/saponin fraction	Anti-apoptotic Antioxidant	(Lee, et al., 2007)
Sida Cordata (Malvaceae)	Leaves	Ethanol extract	Antioxidant	(Sunil, et al., 2013)
Sphaeranthus amaranthoides (Asteraceae)	Whole plant	Ethanolic extract	Antioxidant	(Swarnalatha, et al., 2012)
Symplocus racemosa (Symplocaceae)	Bark	Ethanol extract	Antioxidant	(Dhananjay, et al., 2011)
Terminalia catappa (Combretaceae)	Leaves	Aqueous extract/Corilagin	Antiapoptotic Antioxidant	(Kinoshita, et al., 2007)
Urtica dioca (Utricaceae)	Seed	Diethyl ether extract	Antioxidant	(Yener, et al., 2009)
Woodfordia fruticosa (Lythraceae)	Flowers	Methanolic extract	Antioxidant	(Nitha et al., 2012)

PHYTOCONSTITUENTS AS HEPATO PROTECTIVE AGENTS

Cell reinforcement and hepatoprotective exercises of flavonoids, polyphenols, terpenoids and phenyl propanoids are very much investigated. A rundown of these mixes is appeared in Table 2 with data on the synthetic nature, class of compound and its instrument of activity. The hepatoprotective action of cichotyboside, a sesquiterpene glycoside acquired from the seeds of Cichorium intybus. Cichotyboside weakened the levels of serum compound markers which were hoisted because of CCl4 inebriation (Ahmed et al., 2008). Two new oleanolic corrosive saponins celosin C and celosin D were confined from the ethanol concentrate of Semen celosiae which were examined for

hepatoprotective activity against CCl4 actuated harmfulness () 40. Secluded saponins demonstrated prophylaxis activity which was obvious from reestablishing the serum biochemical and cell reinforcement parameters. Troxerutin, a trihydroxyethylated subsidiary of rutin ensures the mouse liver against oxidative pressure intervened damage initiated by D-galactosamine (Sun et al., 2010). Troxerutin ensured the mouse liver by constricting lipid peroxidation, reestablishing the exercises of cell reinforcement proteins and stifling incendiary reaction. The hepatoprotective action of onitin and luteolin disengaged from the elevated parts of Equisetum arvense against tacrine actuated cytotoxicity in human liver determined Hep G2 cells. The existences of cancer prevention agent standards in plant are in charge of its hepatoprotective activity (Zhang et al., 2009; Oh et al., 2004).

Table 2.Chemically defined molecules with hepatoprotective action

Phytocompound	Pharmacological Model	Mechanism	References
α &β amyrin Triterpene)	Acetaminophen induced	Antioxidant	(Oliveira et al., 2005)
Arjunolic acid (Triterpenoid saponin)	Paracetamol induced	Antiapoptotic	(Ghosh et al., 2010)
Asiaticoside (Triterpenoid)	D-GalN/LPS induced	Anti-inflammatory	(Zhang et al., 2010)
Baicalein (Flavone)	D-GalN/LPS induced	Antiapoptotic	(Wu et al., 2010)
Berberine (Isoquinoline alkaloid)	H_2O_2-induced	Antiapoptotic	(Zhu et al., 2013)
Chrysin (Flavone)	N-nitrosodiethyl-amaine induced	Antioxidant Antihepatocarcinogenic	(Glory and Thiruvengadam. 2012)
Curcumin (Polyphenol)	Dimethylnitrosamine induced	Anti-inflammatory	(Farombi et al., 2008)
Dehydrocavidine (Alkaloid)	CCl_4 induced	Antioxidant Antifibrinolytic	(Wang et al., 2011)
Echinacoside (Phenyl ethanoid)	CCl_4 induced	Antioxidant	(Wu et al., 2007)
Genipin (Aglycone)	D-GalN/LPS induced	Antioxidant Antiapoptotic	(Kim et al., 2010)
Genistein (Isoflavone)	Acetaminophen induced	Antioxidant	(Jing et al., 2013)
Hesperitin (Flavanone)	Cadmium induced	Antioxidant	(Pari and Shagirtha. 2012)
Kahweol/Cafestol (Diterpenes)	CCl4 induced	Antioxidant	(Lee et al., 2008)
Kolaviron (Flavanoid)	Dimethylnitrosamine induced	Antioxidant Anti-inflammatory	(Farombi et al., 2009)
Lupeol (Triterpene)	Acetaminophen induced	Antioxidant Antiapoptotic	(Kumari and Kakkar. 2012)
Mangiferin (Phenol)	D-GalN induced	Antioxidant Antiinflammation	(Das et al., 2012)
Oleuropein (Secoiridoid)	CCl4 induced	Antioxidant	(Domitrovic et al.,

		Antifibrinolytic Antiinflammatory	2012)
Phyllanthin (Lignan)	Ethanol induced	Antioxidant	(Chirdchupunseree and Pramyothin. 2010)
Puerarin (Isoflavone)	CCl4 induced	Antioxidant	(Xia et al., 2013)
Schisandrin B (Lignan)	CCl4 induced	Antioxidant	(Chiu et al., 2003)
Ursodeoxycholic acid	Alcoholic induced	Antioxidant	(Lukivskaya et al., 2006)
Xanthohumol (Prenyl flavonoid)	CCl4 induced	Antioxidant	(Pinto et al., 2012)

MARINE SOURCES FOR TREATMENT OF LIVER DISEASES

Recently much consideration has been given to marine life forms because of their significant biodiversity that has been found in the across the board seas that cover more than 70% of the world. Fundamentally extraordinary optional metabolites have been segregated and distinguished from marine living beings which are accounted for their hostile to malignancy, against bacterial, calming and hostile to hypertensive activities (Chin et al., 2006). Some marine sources with set up hepatoprotective action are appeared in Table 3 with data on sort of marine source, and their system of activity.

Table 3.Marine sources with reported hepatoprotective action

Marine Source	**Type of organism**	**Extract/Compound**	**Mechanism**	**Reference**
Chlorella vulgaris	Green algae	Aqueous extract	Antioxidant	(Li et al., 2013)
Dunaliella salina	Green algae	Carotenoid rich	Antioxidant	(Hsu et al., 2008)
Ecklonia stolonifera	Brown algae	Phlorofucofureckol A	Antiapoptotic	(Lee et al., 2012)
Gelonia eros	Hard clam (Mollusk)	Ethylacetate	Antioxidant	(Yeh et al., 2012)
Hizikia fusiformis	Brown algae	Glycoprotein	Antiapoptic	(Hwang et al., 2008)
Holothuria alra	Sea cucumber	Acetonitrile/trifluroacetic acid-60:40	Antioxidant	(Bupesh et al., 2012)
Hypnea muciformis	Red algae	Ethanolic extract	Antioxidant	(Esmat et al., 2013)
Padina boergesenii	Brown algae	Diethylether	Antioxidant	(Karthikeyan et al., 2010)
Sargassum polycystum	Brown sea weed	Ethanolic extract	Antioxidant	(Raghavendran et al., 2007)

MICROBIOLOGICAL SOURCES AS HEPATOPROTECTANTS

Microorganisms being a gainful wellspring of fundamentally different bioactive metabolites have yielded the absolute most essential results of pharmaceutical industry. These incorporate antibacterial, immunosuppressive, cholesterol bringing down and antitumor antibacterial specialists. Table 4 enrolled the microbial hotspots for the treatment of liver diseases alongside their sort of study and component of activity.

Table 4.Biological sources and their activity against liver hepatotoxins

Organism	Type of organism	Extract/ compound	Mechanism	Reference
Antrodia cinnamomea	Mushroom	Ethanol extract/antroquinonol	Antioxidant	(Kumar, et al., 2011)
Arthrospria platensis	Cyanobacterium	P-Phycocyanin	Antioxidant	(Nagaraj, et al., 2011)
Cordyceps militaris	Fungi	Aqueous extract	Antiapoptotic Anti-apoptotic	(Wang, et al., 2012)
Ganoderma lucidum	Lingzhi mushroom	Ganodermanondiol	Antioxidant	(Li, et al., 2013)
Ganoderma tsuage	Reishi Mushroom	Aqueous extract	Antifibrotic	(Wu, et al., 2013)
Monascus anka	Mold	Dimerumic acid	Antioxidant	(Aniya, et al., 2000)
Morchella esculenta	Morel mushroom	Cultured mycelium	Antioxidant	(Nitha, et al., 2013)
Phormidium tenue	Cyanobacterium	Phycoerythrin	Antioxidant	(Soni, et al., 2008)
Pleurotus ostreatus	Oyster mushroom	Ethanol extract	Antioxidant	(Jayakumar, et al., 2006)
Sacchromyces cerevisiae (YA03083)	Baker's yeast	Fermented extract containing GSH, Cysteine	Antifibrogenetic	(Lai, et al., 2009)
Spirulina platensis	Cyanobacterium	Phycocyanin	Antioxidant	(Bashandy, et al., 2011)

Table 5.List of Hepatoprotective plants

Botanical name	Family	Parts used	Chemical constituents	Screening method	Reference
Amaranthus caudatus Linn	Amaranthaceae	Whole plant	Flavonoids, saponins, glycosides	CCl_4 induced	Venkatesh, 2011
Anisochilus carnosus Linn	Lamiaceae	Stems	Alkaloids,flavonoids, glycosides	CCl_4 induced	Venkatesh, 2011
Asparagus racemosus Linn	Asparagaceae	Roots	Phenols, coumarins	Paracetamol induced	Rahimom, 2011

Azima tetracantha	Salvadoracaeae	Leaves	Flavonoids, triterpenoids	Paracetamol induced	Arthika, 2011
Calotropis procera R.Br	Asclepediaceae	Root bark	Terpinoidsglycosides,flavonoids	CCl_4 induced	Patiprakash, 2011
Cajanus cajan Linn	Leguminosae	Pigeon pea leaf	Flavonoids, stibenes	D-galactosamine	Akinloye, 2011
Cajanus scarabaeoides Linn	Fabaeceae	Whole plant	Flavonoids	Paracetamol induced	Pattanayak, 2011
Carissa carindas Linn	Apocyanaceae	Root	Alkaloids, tannins, steroids	CCl_4 induced	Balkrishnan, 2011
Clitoria ternatea Linn	Fabaceae	Leaves	Phenolic flavonoids	Paracetamol induced	Yengchen, 2011
Cucumis trigonus Roxb	Cucurbitaceae	Fruit	Flavonoids	CCl_4 induced	Imtiaz, 2010
Ficus religiosa Linn	Moraceae	Stem bark	Glycosides, steroids, tannins	Paracetamol induced	Suryawanshi, 2011
Garcinia indica Linn	Clusiaceae	Fruit rind	Benzophenones, garcinol	CCl_4 induced	Bhalchandra, 2011
Gmelina asiatica Linn	Verbenaceae	Aerial parts	Flavonoids	CCl_4 induced	Parthasarathy, 2011
Hyptis suaveolens linn	Lamiaceae	leaves	Flavonoids	Acetaminophen induced	Babalola, 2011
Leucas cilita Linn	Lamiaceae	Whole plant	Flavonoids	CCl_4 induced	Qureshi, 2010
Melia azhadirecta Linn	Piperaceae	leaves	Spectro photo metric method	CCl_4, silymarin	Rajeswary, 2011
Morinda citrifolia Linn	Rubiaceae	Fruit	Saponins, triterpins, steroids	Streptozotocin induced	Nayak, 2011
Myoporum lactum Linn	Myoporaceae	Leaves	Flavonoids	Profenofos induced	Mohammad, 2011
Myrtus communis Linn	Myrtaceae	Leaves	Flavonoids, terpenoids, steroids	Paracetamol induced	Phaneendra, 2011
Solanum nigram Linn	Solanaceae	Fruits	Flavonoids, terpenoids	CCl_4 induced	Subash, 2011

The liver is a crucial organ of foremost significance engaged with the support of metabolic capacities and detoxification of the exogenous and endogenous difficulties like xenobiotics, drugs, viral diseases and constant liquor abuse (Dienstag and Isselbacher. 2001). Assorted homeostatic systems are influenced if liver capacity is hindered, with potentially genuine outcomes. Around 20,000 passings happen each year because of liver diseases.

Hepatocellular carcinoma is one of the ten most normal tumors on the planet with more than 2, 50,000 new cases every year. In spite of the fact that infections are the fundamental driver of liver diseases, over the top drug therapy, environmental contamination and alcoholic inebriation are normal. Liver disease is an overall issue; Conventional drugs utilized as a part of the treatment of liver diseases are once in a while lacking and can have genuine antagonistic impacts. Herbal medicines are in awesome demand in the created and creating nations for essential healthcare in view of their wide natural and medicinal exercises, higher wellbeing edges and lesser costs (Chattopadhyay and Bhattacharyya 2007). Current drugs have next to no to offer for easing of hepatic illnesses, though most vital delegates of phytoconstituents utilized for liver diseases mainly on provincial premise incorporate drugs like silymarine (Silybum marianum) and catechin (Anacardium occidentalis) in Europe, Glycyrrhizin (Glycyrrhiza glarbra) in Japan and chizandrins(Schizandra chinesis) in China (Hikino and Kiso. 1988).

DISCUSSION

A lot of medicinal plants, traditionally utilized for thousands of years, are available in gathering of herbal planning of the Indian traditional health care system. In India, more than 40 polyherbal business details rumored to have hepatoprotective activity are being utilized. Investigation of the writing shows that 160 phyto-constituents from 101 plant families have antihepatotoxic action (Handa et al., 1986; Sharma et al., 1991). Silymarin; a phytoconstituent from (Silybum marianum) has been generally utilized from old circumstances in light of its magnificent hepatoprotective activity. Pichrorriza kurroa Royle contains kutokoside and picroliv which are potential hepatoprotectant (Dwivedi et al., 1990; Dwivedi et al., 1991; Tripathi et al., 1991; Visen et al., 2004). Phyllanthus amarus is another most imperative plant chose for clinical preliminaries. The writing overview on liver defensive herbal drugs; herbal drugs utilized as a hepatoprotective in Ayurvedic system of medicine. From many year, the Ayurvedic plans are being utilized in Indian subcontinent to cure liver disorders, common concoction constituents and inorganic salts are endorsed to treat the liver difficulties of minor to sevior sort of liver poisonous quality. Liver defensive herbal drugs contains an assortment of compound constituents like phenols, coumarins, lignans, basic oil, monoterpenes, carotinoids, glycosides, flavonoids, lipids, alkaloids and xanthines. Sesquiterpenes have been accounted for from Atracyclodes maerocephala. Andrographis panicles and Gardenial florida are the main wellspring of diterpenes and carotinoids separately. Concentrate of around 25 distinct plants have been accounted for to cure liver disorders. Some herbal drugs, for example, as Adenosma indiana, fragrant amides of Clausena lansium, Ginseng saponins and polysaccharides of Auricularia auricular and Tremella fuciform likewise have hepatoprotective property (Table 1). In Ayurveda around 77 herbal drugs are utilized as hepatoprotective specialists. There are diverse plants and their parts utilized for liver treatment, for example, Sanguinaria candesis (roots), developed in U.S.A. and Canada is prompted in hepatic broadening and in the hysteric with no natural sore. Tarazacum officinale roots, found in Europe, Himalaya, Nigeria, North-West Provinces and North America, are exhorted in interminable liver disease (Khory and Katrak. 1981). Chelidonium majus entire plant of Europe and North America is given in both intense and endless hepatitis. At the point when the patient experiences gout notwithstanding hepatitis, Colchicum is helpful. Linseed alone or with opium is utilized as poultices over the hepatic locale in intense hepatitis. Hydastis is helpful in malarial jaundice and that because of catarrh of the bile conduits. Podophyllin is helpful in catarrhal or malarial jaundice when stool are mud shaded and display

no hint of bile; stillinea is utilized to calm slow liver after discontinuous fever needed to cure jaundice. Bryonia alba root, a lasting plant of southern Europe and East Indies, is helpful in different hepatic diseases primarily hepatalgia (Table 2).

Various drug formulations are employed in Ayurvedic system of medicine. The most widely used formulations are: *Jawarish amla, Jawarish altursh, Jawarish alsirin, Jawarish mastagi, Dawaejigarpith, DawaeKarim, Salajin bajuru* and *Sharbat bajuri*. Most of these formulations contain *Andrographis paniculata* Nees, *Asteracatha longifolia* Nees, *Boerrhaavia diffusa* Linn, *Cinchorium intybus* Linn, *Eclipta alba Hassk*, *Oldenlandia corymbasa* Linn, *Picrorrhiza kurroa*, *Rolex benth*, *Solanum nigrum* Linn, *Terminalia chebula* Retz, *Tinosphora cordifolia* (Wild) Miers, etc. are widely used for liver complications. The marketed formulations such as Mandoor Bhasma and Loha Bhasma having single constituents are Bitters and vegetable tonics, e.g. gentian, are useful in functional disorders (Khory and Katrak. 1981). Torpid liver with going with migraine is treated with Livomyn. Ipecachunha is accounted for to advance the stream of bile and given in huge dosages to dysenteric patients enduring likewise with hepatitis. A plan arranged by blending Nux vomica, podophyllum and mecury is valuable in little measurements in hepatic diseases. The critical plans are Acilvan, Hep-10, Liva-16, Livodin, Livosin, Livotrit, Livocin, Vilmliv, Livomycin, Liv-52, Amlycure, Sanliv and so forth. Livin, Livokin, Livomin and Livosin definitions are made out of over the top number of herbal constituents while minimum number of drugs are available in Livertone, Stimuliv, Tefroli and Vimliv. The planning 'Trisoliv' has just Andrographis paniculata Nees. The amount of every herbal drug differs in every detailing (Table.3). This audit incorporates arrangement of hepatoprotective herbal drugs as indicated by their major phytoconstituents, parts utilized and family. It additionally incorporates the standard promoted Ayurvedic plan alongside the name of their makers. Along these lines, the present information will be a useful guide for distinguishing the distinctive parts of the medicinal plants for hepatoprotective potential in different liver confusions.

Table 6.Protective Herbal Drug Along With Their Main Phytoconstituents

S. No.	Main phyto-constituent	Liver protective drug	Part used
1	Phenols	*1. Arnica Montana Linn.*	Plant (Shakun and Zhulkevich. 1955)
		2. *Cichorium intybus Linn.*	Plant (Gilani et al., 1993; Gadgoli and Mishra. 1995)
		3. *Picrorriza kurroa Royle*	Plant (Basu et al., 1971)
		4. *Syzygium aromaticum Linn.*	Plant (Rahman and Megeid. 2006)
2	Coumarin	*1. Armillaria tabescens* Scop.	Fungus (Lu et al., 2007)
		2. Artemisiae capillaries herba	Plant(Lee et al., 2008)
		3. Hemidesmus indicus	Roots (Mookan et al., 2000)
3	Lignans	*1. Schisandra chinensis Turcz.*	Fruit(Maeda et al., 1981)
		2. Schisandra sphenanthera	Fruit(Yu. 1991)
		3. Silybum marianum Gaertn	Seed (Hikino et al., 1984; Tasduq et al., 2005)
		4. Thujopsis dolabrata	Leaves (Hikino et al., 1979)
4	Essential oil	*1. Anethum graveolens Linn.*	Fruit (Shanthasheela et al., 2007)

		2. Apium graveolens Linn.	Seed (Singh et al., 1995; Subramoniam and Pushpangadan. 1999)
		3. Azadirachta indica	Leaves (Kale et al., 2003)
		4. Carapa guianensi Aublet	Seed (Costa-Silva et al., 2008)
		5. Cynara scolumus Linn.	Leaves, Flower(Adzet et al., 1987)
		6. Foenuculum vulgare Mill.	Plant (Ozbek et al., 2003; Tognolini et al., 2007)
		7. *Petroselinum sativum Hoffm.*	Plant (Luzmila et al., 2007)
		8. Pimpinella anisum Linn.	Plant (Marques and Farah. 2009)
5	Monoterpens	*1. Murraya koenigii Linn.*	Rhizome (Einstein et al., 2006)
6	Sesquiterpens	*2. Atractylodis lanceae Rhizoma* 35	Root (Kiso et al., 1983)
		3. Lindera strychnifolia (Sieb. & Zucc.)	Leaves (Kouno et al., 2001)
7	Diterpens	*1. Andrographis paniculata Nees*	Whole plant (Choudhary et al., 1984; Handa and Sharma. 1990)
8	Triterpens	*1. Glycyrrhiza glabra Linn.*	Root (Tanaka et al., 2006; Kumarpal et al., 2002)
		2. Hedyotis corymbosa Linn.	Whole plant (Sadasivan et al., 2006)
		3. Protium heptaphyllum Aubl.	Trunkwood (Rao S et. al. 2005)
		4. Sambucus chinesis Lindley	Plant (Zhu et al., 2008)
		5. Tetrapanax papyriferus	Leaves (Sohn et al., 2009)
9	Carotenoids	*1. Gardenia florida*	Fruit(Chandan et al., 2007)
10	Glycosides	*1. Aloe barbadensis Mill*46	Leaves(Chandan et al., 2007)
		*2. Dianthus superbus Linn.*40	Plant(Kumarpal et al., 2002)
		3. *Panax ginseng*40	Rhizome(Kumarpal et al., 2002)
		4. Polygonum cuspidatum	Root (Xiao et al., 2002)
		5. *Polygonum multiflorum Thunb.*	Root (Xiao et al., 2002)
11	Flavonoids	*1. Acacia catechu Willd.*	Hard wood (Jayasekhar et al., 1997)
		2. Aegiceras corniculatum	Stem (Roome et al., 2008)
		3. Artemisia capillaries Thunb.	Plant(Lu et al., 2007)
		4. Calotropis gigantean R. Br.	Leaves(. Lodhi et al., 2009)
		5. Canscora decussate Roxb.	Plant and Juice(Battacharya et al., 1972)
		6. Cassia occidentals Linn.	Leaves(Czinner et al., 2000)
		7. Clausena dentate Willd.	Plant(Jafri et al., 1999)
		8. Garcinia kola Heckel	Inflorescences(Rajesh et al., 2009)
		9. Helichrysum arenarium Linn.	Plant(Akintonwa and Essien. 1990)
		10. Mentha longifolia Linn.	Leaves(Czinner et al., 2000; Mimica-Dukic et al., 1999)

		11. Phyllanthus emblica Linn.	Leaves (Pramyothin et al., 2006)
		12. Scrophularia grossheimi	Plant(Jafri et al., 1999)
		13. Tagetes patula Linn.	Seeds (Rajesh et al., 2009)
		14. Uncaria gambir (Hunter)Roxb	Heartwood (Akintonwa and Essien. 1990; Akhmedov et al., 1969)
12	Alkaloids	*1. Aristolochia clematis*	Plant(Faizi et al., 2008; Thabrew and Hughes. 1998)
		2. Fumaria parviflora Lam.	Plant(Ku et al., 2008)
		3. Fumaria officinalis Linn.	Plant(Ku et al., 2008)
		4. Herniaria glabra Linn.	Whole Plant(Mahadevan. 2007)
		5. Peumus boldus Molina.	Plant(Rhiouani et al., 2008)
		6. Physalis peruviana	Plant(Lanhers et al., 1991)
13	Xanthines	*1. Coffea Arabica*	Seed (Arun et al., 2007)
		2. Thea sinensis	Leaves (Farah and Donangelo. 2006; Savaa et al., 2003)

Table 7.Hepatoprotective Medicinal Plants Mentioned In Ayurveda

S. No.	Scientific Name	Family	Parts used
1	*Achille millefolium Linn.*	Compositae	Plant
2	*Aconitum herterophy llum wall.*	Ranunculaceae	Root
3	*Aegal marimelos Corr.*	Rutaceae	Leaves
4	*Aegiceras corniculatum*	Aegiceratataceae	Stem
5	*Allium sativum Linn.*	Liliaceae	Bulb
6	*Aloe barbadensis Mill.*	Ranunculaceae	Plant
7	*Aloe perry Baker.*	Ranunculaceae	Plant
8	*Andrographic paniculata Nees.*	Acanthaceae	Plant
9	*Aphanamixis polystachya Wall.*	Meliaceae	Bark
10	*Apium graveolens Linn.*	Umbelliferae	Seeds
11	*Asteracantha longifolia Nees.*	Acanthaceae	Leaves, root, seeds
12	*Azadirachta indica A. Juss*	Meliaceae	Exudates
13	*Berberis lycium Royle.*	Berberidaceae	Leaves
14	*Boerhaavia diffusa Linn.*	Nyctaginaceae	Root
15	*Bryonia alba Linn.*	Cucurbitaceae	Root
16	*Calotropis gigantea (Linn)R.Br.*	Asclepiadaceae	latex, flower, stem
17	*Canavalia ensiformis DC*	Leguminosae	Root
18	*Carapa Guianensis Aublet.*	Meliaceae	Seed
19	*Carthamus tinctorius Linn.*	Compositae	Flower
20	*Cephaelis ipecacuanha Rich.*	Rubiaceae	Draught
21	*Cichorium intybus Schard.*	Compositae	Plant
22	*Citrullus colocynthis Schrad.*	Cucurbitaceae	Root
23	*Clausena dentate Willd.*	Rutaceae	Stem bark
24	*Colchicum luteum Baker.*	Liliaceae	Corma
25	*Coptis teeta Wall.*	Ranunculaceae	Rhizom
26	*Cosmpstigma racemosa Weight.*	Asclepidaceae	Root, Bark

27	*Croton oblongifolius Roxb.*	Euphorbiaceae	Bark
28	*Cuscita reflexa Roxb.*	Convolvulaceae	Stem
29	*Cyprus pertunuis*	Cyperanceae	Plant
30	*Delphinium zalil Atich & Hemse*	Ranunculaceae	Plant
31	*Desmodium biflorum Linn.*	Fabaceae	Whole plant
32	*Eclipta alba Hassk.*	Compositeae	Plant juice
33	*Emblica officinalis Gaertn.*	Euphorbiaceae	Fruit
34	*Euphorbia neriifolia Linn.*	Euphorbiaceae	Fruit
35	*Ferula alliaceae boiss.*	Umbelliferae	Gum resin
36	*Ficus asperrima Roxb.*	Moraceae	Juice and bark
37	*Ficus benjamina Linn.*	Moraceae	Bark juice
38	*Ficus carica Linn.*	Moraceae	Fruit
39	*Ficus hetrrophylla Linn. F.*	Moraceae	Root juice
40	*Flacoutia indica Merr.*	Flacourtiaceae	Bilangra
41	*Fumaria officinalis Linn.*	Fumariaceae	Whole plant
42	*Fumaria parviflora Lam.*	Fumariaceae	Whole plant
43	*Garcinia indica chois.*	Guttiferae	Fruit
44	*Garcinia kola Heckel.*	Guttiferae	Seeds
45	*Gentiana kurroo Royld.*	Gentianaceae	Root
46	*Gymnema sylvestre R. Br.*	Asclepiadaceae	Leaves
47	*Hedyotis corymbosa Linn.*	Rubiaceae	Whole plant
48	*Hemidesmus indicus*	Asclepiadaceae	Roots
49	*Hermodactylus gol*	Colchiceae	Taubers
50	*Herniaria glabra Linn.*	Caryophyllaceae	Flowers
51	*Hygrophila spinosa T. Anders*	Acanthaceae	Leaves, roots, stem, seeds
52	*Hyssopus officinalis Linn.*	Labiatae	Plant
53	*Jatropha gossypifolia Linn.*	Euphorbiaceae	Leaves
54	*Lawsonia inermis Linn.*	Lythraceae	Bark
55	*Luffa echinata Roxb.*	Cucurbitaceae	Fruit and seed
56	*Lycopersicon esculentum Mill.*	Solanceae	Fruit
57	*Mentha longifolia Linn.*	Labiatae	Leaves
58	*Momordica cochimchinesis spreng.*	Cucurbitaceae	Fruit
59	*Moringa oleifera Lam.*	Moringaceae	Root
60	*Murraya koenigii Linn.*	Rutaceae	Leaves
61	*Myristica fragrans Houtt.*	Myristicaeae	Seed
62	*Nelumbo mucifera Gaertn.*	Nymphaceae	Flower
63	*Paeonia emodi Wall.*	Ranunculaceae	Tubers
64	*Phyllanthus niruri Linn.*	Euphorbiaceae	Plant
65	*Picrorhiza kurroa Royle.*	Scrophulariaceae	Root
66	*Pinus roxburghii Sargent*	Pinaceae	Volatile oil
67	*Podophyllum emodi Wall.*	Berberidaceae	Rhizome
68	*Portulaca oleracea Linn.*	Potulacaceae	Herb
69	*Protium heptaphyllum March.*	Burseraceae	Trunk wood

70	*Prunus armeniaca Linn.*	Rosaceae	Fruit
71	*Pyrenthrum indicum DC.*	Compositae	Flowers
72	*Rhem emodi Wall.*	Polygonaceae	Rhizome
73	*Rumex crispus Linn.*	Polygonaceae	Root
74	*Solanum dulcamara Linn.*	Solanaceae	Berries
75	*Solanum indicum Linn.*	Solanaceae	Fruit, plant
76	*Solanum nigrum Linn.*	Solanaceae	Dried fruit
77	*Sphaeranthus hirtus Willd.*	Compositae	Herb
78	*Swertia chirata BuchHam.*	Gentianaceae	Plant
79	*Symplocos racemosa Roxb.*	Symplocaceae	Bark
80	*Taraxacum officinale Weber.*	Compositae	Root
81	*Terminalia chebula Retz.*	Combretaceae	Fruit
82	*Tinospora cordifolia Willd.*	Menispermaceae	Stem
83	*Trichosanthes cordata Roxb.*	Cucurbitaceae	Root
84	*Trigonella foenumgraececum Linn.*	Leguminosae	Seed
85	*Triticum sativum Lam.*	Gramineae	Roots
86	*Vitex negundo Linn.*	Verbenaceae	Plant
87	*Woodfordia fruticosa Kurz.*	Lythraceae	Flower
88	*Zinziber officinale Rose.*	Zingiberaceae	Rhizome

Table 8.Ayurvedic Formulations Used In Liver Complications

S. No.	Plants used in formulation	Formulation containing the plant (Manufacturer)
1	*Achillea millefoiliven Linn.*	Acilvan [1], Hefiaye [17], Amlycure [24], Liv-52 [3], Livex [4], Suliv [5], Neoliv-100 [32], Syliv [33]
2	*Aconitum heterophyllum* wall.	Livex [4]
3	*Acorus calamus* Linn.	Livin [2]
4	*Adhatoda vasica* Nees.	Livol [21]
5	*Aloe*	Livarin [6]
6	*Aloe barbadensis* Mill.	Hepa-10 [7], Livodin [8], Adliv-75 [9], Amlycure [24] Biligen [10]
7	*Andrographis paniculata* Nees.	Hepa-10[7], Kalmegh compound[11], Liva[12], Livarin [6], Livona [3], Livergen [4], Livosin [7], Livospin [25], Lierin [15], livotone[26], Livotrit [27], Livin [16], Livodin [8], Livokin [20], Livol [21],Livomin[22], Livoped[23], Stimuliv[28], Tefroli [3], Trisoliv[30], Jaundex syrup [36]
8	*Andropogon muricatus* Retz.	Adliv -75 [9]
9	*Aphnamixis polystachya* (Wall.) Parker	Livin [16], Livodin [8], Hepa-10 [7], Livomin[22], Livospin [25], Jaundex syrup [36], Triguliv-15 [37], Biligen [14]
10	*Apium graveolens* Linn.	
11	*Artemisia absinthium* Linn. Livomap [35]	Kalmegh compound [11], Liva [12], Livergen [14], Livokin [20], Livoped [23], Livotone [26]
12	*Asteracantha longifolia* Nees. Syn. *Hygrophila spinosa* T.	Adliv-75 [9], Biligen [14], Liva-16 [8], Livergen [14], Livodin [8], Livatona [13], Livokin [20], Livotone [26], Syliv [33]

13	*Avena sativa* Linn.	Livosin [7]
14	*Baliospermum montanum* Muell.	Arg Livin [16]
15	*Berberis lyceum* Royle.	Amlycure [24], Liva [12], Liv-77 [19], Livokin [20], Livomap [35], Livotrit [1], Livol [21], Triguliv-15 [37]
16	*Boerhaavia diffusa* Linn.	Acilvan [1], Amlycure [24], Hepex [17], Hipex [18], Liv-77 [19], Jaundex syrup [35], Liva [12], Liva-15 [8], Livomap [35], Triguliv-15 [37], Livarin [6], Livin [16], Livodin [8], Livomycin [22], Neolin-100 [32], Vimliv [34]
17	*Calotropis gigantea* (Linn) R.	Brex AitJaundex syrup [36]
18	*Carica papaya* Linn.	Liva [12], Livosin [7]
19	*Capparis spinosa* Linn.	Acilvan [1], Liv-52 [3], Livomyn [22], Syli[33]
20	*Carthamus tinctorius* Linn.	Triguliv-15 [37]
21	*Carum copticum* Benth. Syn. *Trachyspermum ammi* (Linn.) Sprague	Adliv-75 [9], Kalmegh compound [11], Livokin [20], Syliv [33]
22	*Casearia esculenta* Roxb.	Avilvan [1]
23	*Cassia angustifolia* VAhl.	Adliv-75 [9], Liva-16 [8], Livatona [13], Livergen [14], Lierin [15], Livodin [8], Liva [12], Livosin [7]
24	*Cassia fistula* Linn.	Livarin [6]
25	*Cassia obtusifolia* Linn.	Amlycure DS [24]
26	*Cassia occidentalis* Linn.	Acilvan [1], Hipex [18], Livomycin [22], Liv-52 [3], Livex [4], Neoliv-100 [32], Syliv [33]
27	*Cassia sophera*	Livin [16]
28	*Cassytha filliformia* Linn.	Amlycure [24]
29	*Cedrus deodara* (Roxb.) Loud.	Livomap [35]
30	*Centella asiatica* (Linn.) Urban	Adliv-75 [9]
31	*Cichorium intybus* Linn.	Acilvan [1], Amlycure [24], Hipex [18], Liv-52 [3], Liv-77 [19], Livokin [20], Neoliv-100 [32], Syliv [33], Vimliv [34]
32	*Citrullus colocynthis* Scharad.	Livin [16]
33	*Crataeva religioosa* Thoms. non Forst. f. syn. *Crataeva nurvala* Buch. Ham.	Hook and Livomap [35]
34	*Eclipta alba* Hassk.	Acilvan [1], Amlycure [24], Hepa-10 [24], Liv-77 [19], Liva-16 [8], Livin [17], Livodin [8], Livokin [20], Livol [21], Livomycin [22], Livosin [7], Livotrit [27], Stimulin [28], Tefroli [29], Vimliv [34], Trignliv-15 [37]
35	*Embelia ribes* Burm. f.	Hipex [18], Livex [4], Livodin [8], Livomin[22], Livosin [7], Livospin [25], Livotrit [27]
36	*Ferula foetida* Regel.	Livosin [7]
37	*Fumaria officinalis* Linn.	Amlycure [24], Hepa-10 [7], Livomin[22], Stimulin [28], Trignliv-15 [37]
38	*Glycyrrhiza glabra* Linn.	Livatona [13], Livomap[35]
39	*Grewia asiatica* Linn.	Trignliv-15 [37]
40	*Heliotropium strigosum.*	Liv-17 [19]

41	*Helleborus niger* Linn.	Trignliv-15 [37], Amlycure [24]
42	*Hemidesmus indicus* R. Br.	Livosin [7]
43	*Holarrhena antidysenterica* Wall.	Adliv-75 [9], Livodin [8], Livotone [26], Livosin [7], Livotrit [27]
44	*Ipomoea turpethum* R. Br.	Biligen [14], Amlycure [24], Livomin[22], Livospin [25], Livokin [20], Livin [16], Livotrit [27]
45	*Jatrorrhiza palmate* Miers.	Livin [16]
46	*Lawsonia inermis* Linn.	Livin [6]
47	*Latsea chinensis* Lam.	Trignliv-15 [37]
48	*Luffa echinata* Roxb.	Hepia-10[7]
49	*Melia azadirachta* Linn. Syn. *Azadirachta indica* A.Juss.	Lierin [31], Livomap[35]
50	*Mentha viridis.*	Livosin [7]
51	*Moringa Pterygosperma* Gaertn.	Livomap[35]
52	*Ocimum sanctum* Linn.	Amlycure [24], Livin[16], Acilvan [1], Livomin[22], Tefroli [29]
53	*Oldenlandia corymbasa* Linn.	Lierin [15], Liva-16 [8], Livatona [13], Livodin[8], Livokin [20], Livoped [23], Livospin [24], Syliv [33]
54	54. *Panicum milliare* Lam.	Amlycure [24]
55	*Phyllanthus emblica* Linn. Syn. *Emblica officinalis* Gaertn.	Hepex, Livertone, Livol, Livosin , Neoliv-100, Vimlin
56	*Phyllanthus amarus* Linn.	Hepex [17], Livomap[35], Amlycure [24], Trignliv-15 [37], Jaundex syrup [36]
57	*Picrorhiza kurroa* Royle ex Benth.	Acilvan [1], Livarin [6], Lierin [15], Livertone [31], Livomap[35], Livokin [20], Livol [1], Livotrit [27], Vimlin [34]
58	*Piper chaba* Hunter.	Livin [16]
59	*Piper longum* Linn.	Lovex [4], Livomap[35]
60	*Piper nigrum* Linn.	Liva-16 [8], Livodin [8]
61	*Plumbago indica* Linn.	Amlycure [24]
62	*Plumbago zeylanica* Linn.	Livokin [20], Livomin[22], Liva [12], Livin [16], Livospin [25], Livotrit [27]
63	*Podophyllum*	Hepa-10 [7], Livosin [7]
64	*Prunus domestica* Linn.	Liv-77[25]
65	*Ptychotis ajowan* DC.	Hepa-10 [7]
66	*Rhammus wightii* W. and A.	Livotone [26], Livotrit [27]
67	*Rheum palmatum* Linn.	Livertone [31]
68	*Ricinus communis* Linn.	Jaundex [36]
69	*Salsola kali* Linn.	Trignliv-15 [37]
70	*Salvandora persica* Linn.	Livin [16]
71	*Salvia plebeian* R. Br.	Livospin [25]
72	*Solanum nigrum* Linn.	Acilvan [1], Amlycure [24], Hepa-10 [7], Hepex [17], Hipex [18], Liv-52 [3], Liva [12], Liva-16 [8], Livarin [6], Livex [4], Livokin [20], Livomin[22], Neoliv-100 [32], Syliv

		[33], Trignliv-15 [37]
73	*Solanum Lanthocarpum* Schrad and Wendl.	Adliv-75 [9], Liva-16 [8], Livodin [8]
74	*Swertia angustifolia* Buch. Ham.	Livospin[25]
75	*Swertia chirata* Buch. Ham.	Biligen [14], Livex [4]
76	*Swertia decussate* Nimmo ex. Grah.	Livomin[22], Amlycure [24]
77	*Tamarix gallica* Linn.	Acilvan [1], Liv-52 [3], Livex [4], Neoliv-100 [32], Syliv [33]
78	*Tecoma undulate* G. Don.	Livarin [6], Neoliv-100 [32], Livomap[35]
79	*Tephrosia hirta*	Liva [12], Trignliv-15 [37]
80	*Tephrosia purpurea* Linn. Pers.	Livin [16], Livokin [20], Livomin[22], Livospin [25], Neoliv-100[32], Livomap[35], Amlycure [24], Tefroli [29]
81	*Terminalia arjuna* W. and A.	Acilvan [1], Liv-52 [3], Liva [12], Livokin [20], Livosin [7], Neoliv-100 [32], Syliv [33]
82	*Terminalia belerica* Roxb.	Livertone [31], Livol [21], Livosin [7], Amlycure [24]
83	*Terminalia chebula* Retz.	Hipex [18], Livertone [31], Livin [16], Livokin [20], Livol [21], Tefroli [29], Terminaalia chebula [7]
84	*Tinospora cordifolia* Willd.	Miers Acilvan [1], Liv-77 [19], Liva-16 [8], Livin [17], Livodin [8], Livol [21], Livomin[22], Livotrit [27], Livomap[35], Trignliv-15 [37]
85	*Trachyspermum ammi* Linn.	Biligen [14], Liva [12], Livatona [13], Livergin [14], Livin [16], Livoped [23]
86	*Trigonella foenum graecum* Linn.	Biligen [14], Liv-77 [19], Livatona [13], Livergin [14], Livin [16], Livoped [23], Livokin [20], Livotone [26]
87	*Varnonia anthelmintica* Willd. Syn. *Centra therum anthelminticum* Willd. Kuntze.	Liva-16 [8]
88	*Withania somnifera* Dunal.	Livosin [7]
89	*Zingiber officinalis* Rose.	Livin [16], Livomap[35], Livomycin[22], Livosin [7]

The number in the square bracket indicates the manufacturer

Note: The List of Manufacturers
[1]. Acis laboratories, Kanpur
[2]. H. V. Pharm, Rajkot (Gujarat)
[3]. Himalaya Drugs Co, Bombay
[4]. Bhartiya Aushadh Nirmanshala, Rajkot (Gujarat)
[5]. Systemic Pharmaceuticals, Allahabad
[6]. Patiala Ayurvedic Pharm, Sirhind
[7]. Jupiter Pharmaceuticals Pvt. Ltd, Calcutta
[8]. Madona Pharmaceuticals Research, Calcutta
[9]. Abala Drugs House, Calcutta
[10]. Standard Pharma Remedies, Calcutta
[11]. Bengal Chemicals Pharmaceuticals Pvt. Ltd, Calcutta

[12]. Herbid (India) Pvt. Ltd, Calcutta
[13]. Scientific Research Industries Pvt. Ltd, Calcutta
[14]. Standard Pharmaceuticals, Calcutta
[15]. Herbs Era Pharmaceutical Udayrajpur (West Bengal)
[16]. Araya Aushadhi Pharmaceutical Works, Indore
[17]. The Anglo-French Drug Co. (Eastern) Ltd, Bombay
[18]. H. V. Pharmaceuticals, Rajkot (Gujarat)
[19]. Gobe Pharmaceuticals, Jalandhar City (Punjab)
[20]. = Herbo-Med, Calcutta
[21]. = Vedic Pharm, Calcutta
[22]. Charak Pharmaceuticals (India) Pvt. Ltd, Umbargaon (Gujarat)
[23]. = Anakem Laboratories Pvt. Ltd, Calcutta
[24]. Aimil Pharmaceuticals Pvt. Ltd, Calcutta
[25]. Herbals (APS) Pvt. Ltd, Patna
[26]. East India Pharmaceutical Works Ltd, Calcutta
[27]. Zandu Pharmaceutical Works Ltd, Bombay
[28]. Franco-Indian Pharmaceutical Works Ltd, Bombay
[29]. TTL Pharma Pvt. Ltd, Madras
[30]. Medley Pharm Pvt. Ltd, Bombay
[31]. Gambers Laboratories, Bombay
[32]. Bharat Pharmaceuticals, Delhi
[33]. Systemic Pharmaceuticals, Allahabad
[34]. Solumiks, Bombay
[35]. Maharishi Ayurveda Corporation Ltd, New Delhi
[36]. D. K. Sandu Bros. Chember Pvt. Ltd, Bombay
[37]. Triguna Ayurveda Research Lab, New Delhi

CONCLUSION

A phytotherapeutic way to deal with current drug advancement can give numerous priceless drugs from traditional medicinal plants. Look for unadulterated phytochemicals as drugs is tedious and costly. Various plants and polyherbal details are utilized for the treatment of liver diseases. In any case, in the vast majority of the serious cases, the treatments are not agreeable. Albeit trial assessments were completed on a decent number of these plants and details, the examinations were for the most part inadequate and deficient. The helpful values were tried against a couple of synthetic compounds incited subclinical levels of liver harms in rodents. Advancement of such medicines with standards of wellbeing and viability can renew treatment of liver disorders and hepatoprotective movement.

The plant separates and their secluded mixes, marine and microbial discoveries for the treatment of liver disease, featuring on characteristic items that harbor bioactive particles which may apply hepatoprotective activity. Regular items have traditionally supported the recognizable proof and examination of potential focuses for drug improvement and this capacity is still of significance today. The pharmaceutical business is confronting genuine difficulties as the drug discovery process is ending up amazingly costly, less secure and fundamentally wasteful. Regular items have filled in as a noteworthy wellspring of

drugs for a considerable length of time, and about portion of the pharmaceuticals being used today are gotten from characteristic items. Anyway careful exploratory outlines utilizing multidisciplinary approaches alongside standardization and portrayal of regular items are basic for the effective advancement of novel and promising treatments.

Considering the enormous biodiversity resources of Indian traditional system and the high incidence of liver complications, the present review extensively focuses on collection of data for different plants, which are available in India. These medicinal plants claimed as liver protective agents are classified according to their biological source, phytoconstituents; part used and plants in formulations. People from India are still dependent on conventional therapies to treat liver complications. Because of their easy availability and low cost. Since large mass of populations used preferable herbal preparation, therefore there is need to be evaluate for their proportion, their dose and rational behind combination in different polyhedral preparation.

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