



Review Article

REVIEW ON MEDICINAL PLANTS UNVEILING HEPATOPROTECTIVE ACTIVITY

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ABSTRACT

Medicinal plants have remained as a godsend for the current scientific advancements in terms of providing dealing with diseases. The current review provides the data regarding the medicinal plants which have been reported for hepatoprotective activity and which are to be reported for treating many disorders of humankind. The review covers the recent and updated data of medicinal plants to treat all kinds of hepatic disorders which are studied by inducing different methods. As the main metabolic center of human body liver plays a major role in disintegrating the drugs and also considered as the main center which can be affected easily due to toxicity and with the other disorders that can be elicited due to excess use of therapeutic drugs or due to mis use of drugs.

KEYWORDS: Medicinal plants, Hepatoprotective, Phytoconstituents

INTRODUCTION

Liver is the gland that carries a variety of physiological functions and plays a major role in protecting the other vital organs also getting damaged from any kind of disorders that will occur due to the drug usage. Medicinal plants have been given away a foremost protagonist in the management of innumerable liver ailments. Due to the lack of operative liver defending medication in contemporary medicine, more than a few herbal possibilities for the dealing of liver ailments in Ayurveda are advised. Western medicine is diminutive to give for hepatic illness therapy, and it is principally plant grounded research that is used to treat hepatic disorders. Therefore, many popular remedies of plant origin are being assessed for their probable hepatoprotective effects. In ethnomedical practice, several medicinal plants and their preparations are used for hepatic diseases as well as the traditional system of medicine in India. Herbs play a vital role in managing different liver diseases. A variety of herbal preparations for hepatic disease treatment is suggested in Ayurveda due to the absence of secure and efficient hepatic protective medication in modern medicine.

COLLECTION OF DATA

The current review was made from the literature collected from the research studies which were published in google scholar, Elsevier, PubMed, Research gate and google for the past 10years.

FUNCTIONS OF LIVER

Main functions of liver are enlisted below:

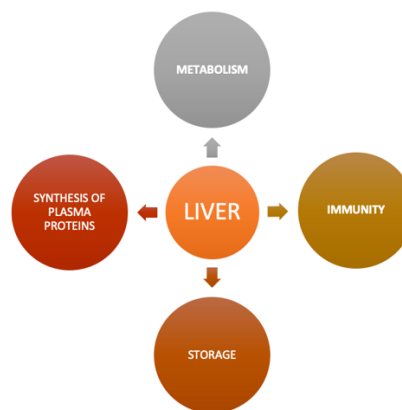


Fig 1: Functions of liver

- The main function of liver is to carryout metabolism of different products like carbohydrates, proteins, lipids and many other hormones that circulate in human body.
- Synthesis of plasma proteins like albumin, clotting factors like fibrinogen, bile salts, cholesterol, amino acids, urea, vitamins etc.
- Storage of vitamins like A, D, E, K and glycogen and also helps to regulate the blood sugar levels.
- Liver also helps to maintain the immune functions of the body as it supplies and contains macrophages that are needed by the half of the body.

PATHOGENESIS

PATHOPHYSIOLOGY OF LIVER DISEASES

The major diseases of liver are represented below

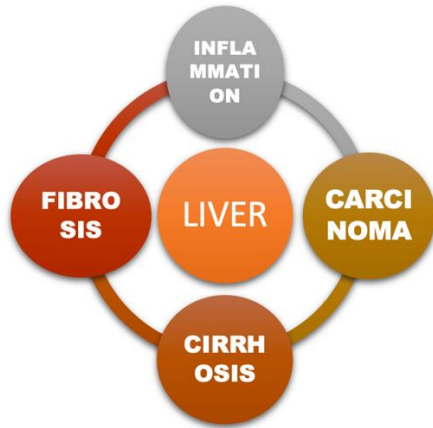


Fig 2: Pathogenesis of liver Diseases

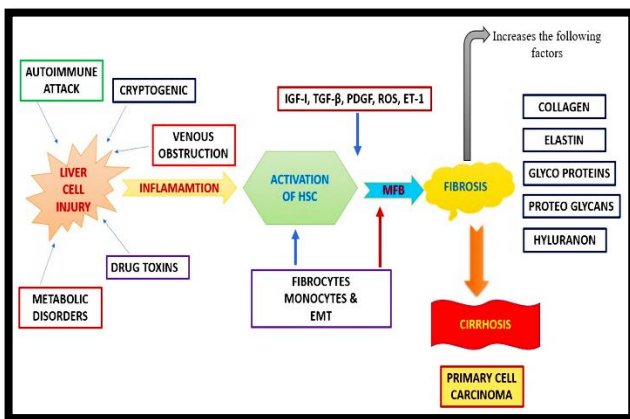


Fig 3: Pathophysiology of liver Diseases

SIGNS AND SYMPTOMS OF LIVER DISEASES

CONVENTIONAL THERAPY AVAILABLE

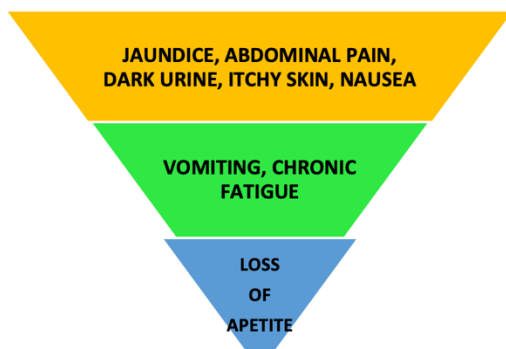


Fig 4: Signs and Symptoms of liver Diseases

THERAPY

VASOPRESSIN, PROPONOLOL, LACTULOSE, NEOMYCIN SULFATE

SPIRINOLCTONE, AMILORIDE, CHLOROTHIAZIDE, FUROSEMIDE, TRIAMETERENE

MAGNESIUM SULFATE, VIT.K

Fig 5: Conventional Therapy of Liver Diseases

TOXIC EFFECTS

Generally occurring toxic effects of available conventional therapy are listed below:

Syndrome of inappropriate ADH, Tremors, Angina Pectoris, Hypertension, Diarrhoea, Vomiting & Bloating which leads to the prolonged usage of other chemical agents to treat these gastric problems which ultimately leads to the CVS disorders, that's evident

To get devoid of all these side effects and toxic effects here a list of medicinal plants which have provided the evidence of hepato protective effect are enlisted.

Chemical structure of some of the hepatoprotective phytoconstituents

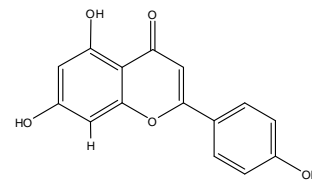


Fig 6: Apigenin

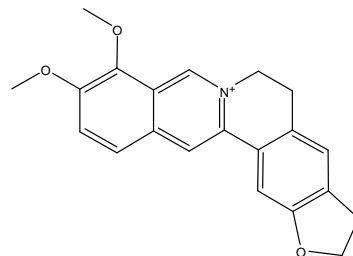


Fig 7: Andrographolide

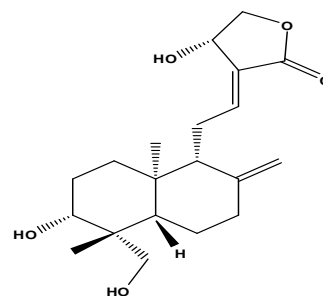


Fig 8: Berberine

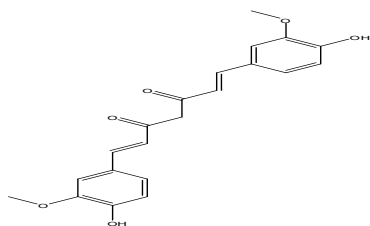


Fig 9: Curcumin

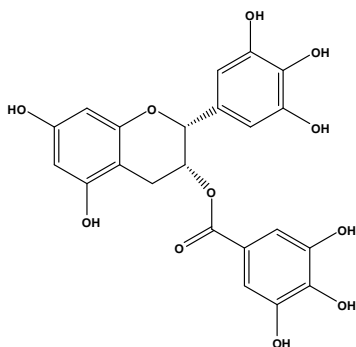


Fig 10: Epigallocatechin-3-gallate

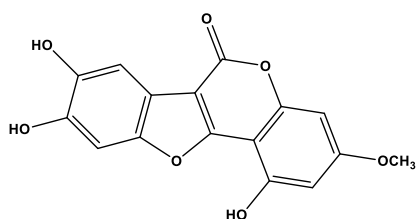


Fig 11: Wedelolactone

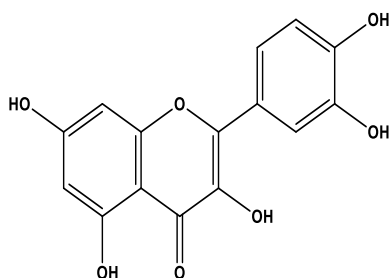


Fig 12: Quercetin

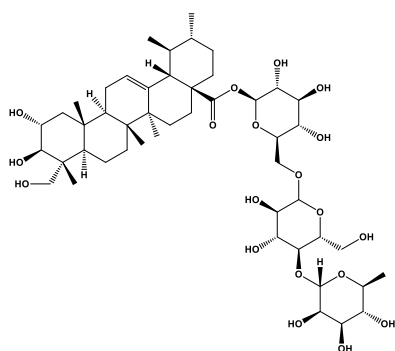


Fig 13: Asiatica

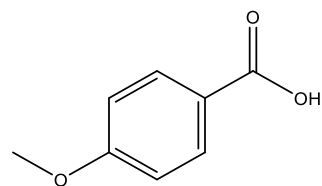


Fig 14: Para-methoxy benzoic acid

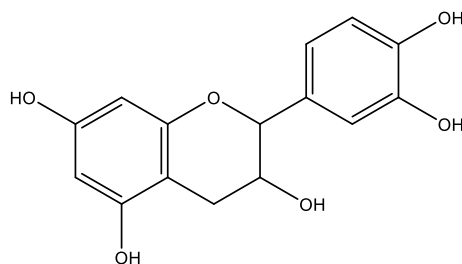


Fig 15: Catechin

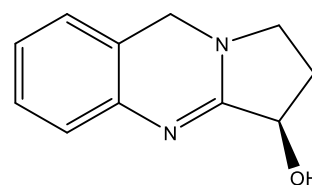


Fig 16: Vasicine

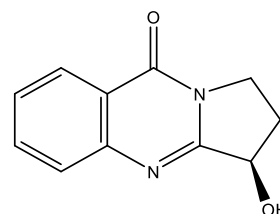


Fig 17: Vasicinone

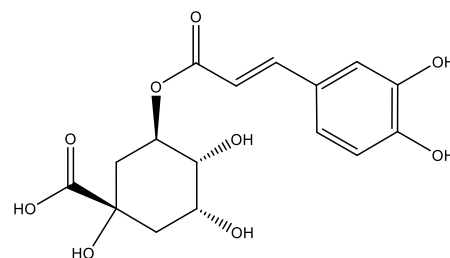


Fig 18: Chlorogenic acid

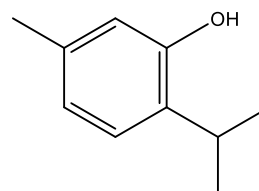


Fig 19: Thymol

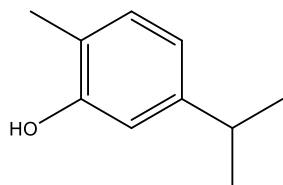


Fig 20: Carvacrol

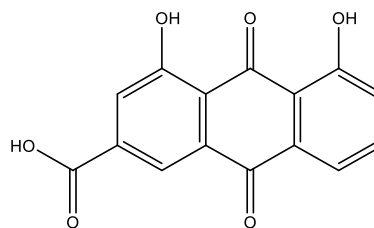


Fig 25: Rhein

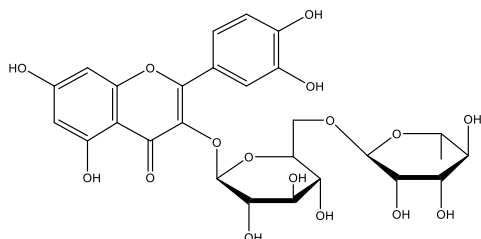


Fig 21: Rutin

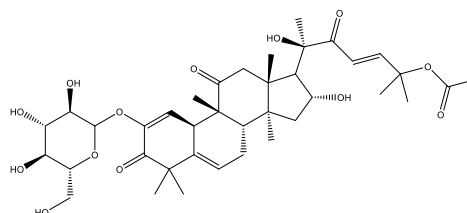


Fig 26: Colocynthin

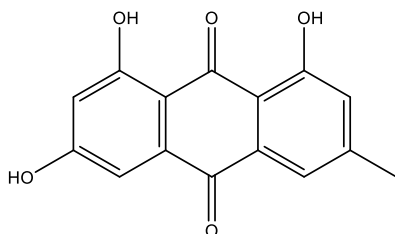


Fig 22: Emodine

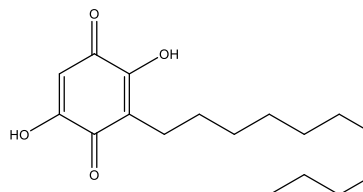


Fig 27: Embelin

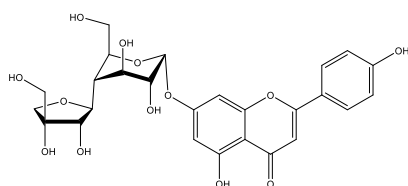


Fig 23: Apiin

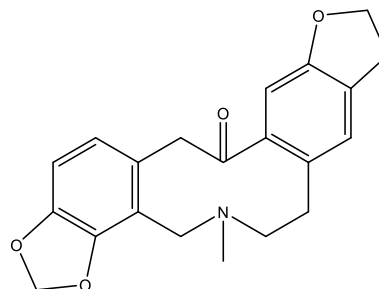


Fig 28: Fumarine

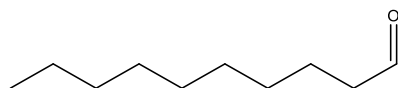


Fig 24: Decaldehyde

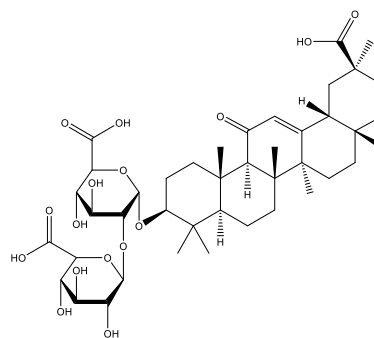


Fig 29: Glycyrrhizin

Table 1: List of Medicinal plants reported for Hepatoprotective activity ¹⁻⁵⁰

Name of the Plant	Source or Family	Plant Part used	Extracts studied	Metabolites present in the extract	Experimental animals used	Hepatotoxicity Inducing agent	Biochemical and Histopathological Parameters studied	Applications	Reference
<i>Triticum aestivum</i>	Poaceae	Seed	Petroleum ether Chloroform Acetone Alcoholic Hydro-alcoholic Aqueous	Carbohydrates, phenolics, proteins, resins, lipids and flavonoids	Swiss albino rats of either sex 125 to 150 g	Carbon tetra chloride 1 ml/kg b.w. (along with olive oil 1:1)	AST, ALT, ALP, bilirubin and albumin	Preventing cardiovascular disease and certain cancers	Khan GM et al., 2013.
<i>Jatropha gossypifolia</i>	Euphorbiaceae	Aerial parts	Methanol	Cyclogossine A and B Alkaloid Jatrophine	Wistar albino rats (120-200 g) of either sex	Carbon tetra chloride 1mL/kg, s.c.	Serum glutamate oxaloacetate transaminase, serum glutamate pyruvate transaminase, catalase, serum alkaline phosphatase.	The roots are employed against leprosy, as an antidote for snakebite and in urinary complaints. A decoction of the bark is used as an emmenagogue and leaves for stomachache	Bipin Bihari et al., 2009
<i>Macrothelypteris torrestiana</i> (Gaudich.)	Thelypteridaceae	Leaves	Ethanol	5,7-dihydroxy-2-(1,2-isopropylidiox y-4-oxocyclohex-5-enyl)-chromen-4-one, a novel flavonoid, protoapigenin, apigenin, kaempferol and quercetin	Wistar albino rats 150-250 g both either sex, Swiss albino mice (20-25 g) of either sex	0.2% CCl ₄ in olive oil (8 mL/kg, i.p)	SGOT, SGPT, ALP, Total bilirubin and Total protein	Chronic skin ulcer and inflammation. Used in treatment of edema for patients suffering from kidney problem	Bipin Bihari et al., 2017
<i>Vernonia ambigua</i>	Araceae	Tubers	Ethanol	Sesquiterpene and steroidal constituents	Albino Rats	CCl ₄ 1ml/kg	AST, ALT, ALP, total cholesterol, triacylglycerols	Antidiabetic effects effective against <i>Plasmodium falciparum</i> <i>in vitro</i> fungistatic	Orji O.U et al., 2015
<i>Amorphophallus campanulatus</i>	Araceae	Stem	Ethanol	Alkaloids, carbohydrates, proteins, amino acids, phenolic compounds, glycosides and flavonoids	Wistar albino rats and mice of either sex	CCl ₄ : liquid paraffin (1:1, 2 mL/kg body weight, s.c.	AST, SGPT, ALP and total bilirubin AST, SGPT, ALP and total bilirubin	traditionally for the treatment of piles, abdominal pain, tumors, enlargement of spleen, asthma and rheumatism traditionally for the treatment of piles, abdominal pain, tumors, enlargement of spleen, asthma and rheumatism traditionally for the treatment of piles, abdominal pain, tumors, enlargement of spleen, asthma and rheumatism used traditionally for the treatment of piles, abdominal pain, tumors, enlargement of spleen, asthma and rheumatism used traditionally for the treatment of piles, abdominal pain, tumors, enlargement of spleen, asthma and rheumatism	Sanjay jain et al., 2009

								pain, tumors, enlargement of spleen, asthma and rheumatism used traditionally for the treatment of piles, abdominal pain, tumors, enlargement of spleen, asthma and rheumatism	
<i>Capparis sepiaria</i>	Capparaceae	Whole plant	90% alcohol	Quercetin	Male swiss albino mice (6-8 weeks old, 25-30 g)	CCl4 (1 ml/kg bw)	ALT, AST and ALP	Anti-rheumatic, tonic, expectorant, antispasmodic, diuretic and analgesic agents	Hossein Forouzan deh et al , 2018
<i>Rhusmysorensis</i>	Anacardiaceae	Whole plant	Methanol	—	Albino rats of either sex (100-150 gm)	Paracetamol 1.25 ml/kg as 1:1 mixture with olive oil	SGOT, SGPT, SLAP	—	Noorulla Khadri et.al , 2014
<i>Cochlospermum inctorium</i>	Cochlospermaceae	leaves	Methanol	Presence of both enzymic and non-enzymic antioxidants	white albino rats of either sex, weighing 150-180 g	CCl4 (1 ml/kg bw).	SPGT, SGOT, bilirubin and cholesterol	Used as remedy for gonorrhoea, jaundice, gastrointestinal diseases, helminthes and bilharzias infestations, as well as for the management of epilepsy	Oluseyi Adeboyeakinloye et al., 2012
<i>Cichorium intybus</i>	Asteraceae	leaves,	Hydroalcoholic extract	—	male albino rats of Wistar strain, each weighing 150 - 180 g	CCl ₄ (1 ml/kg Bw)	serum levels of TP, Alb and TB	used in the treatment of jaundice, liver enlargement, gout and rheumatism	Sadeghi et al., 2008
<i>Bauhinia variegata</i>	Fabaceae	Aerial parts	Methanol	Tannis, Total phenols, Flavonoids and other polyphenolic compounds in Root	Albino wistar rats of either sex weighing 150-200g	CCL ₄ 1 ml/kg/d dissolved in olive oil (1:1)	AST, ALT, ALP and Level of total protein	Gastrointestinal tract as carminative, anti-helminthic and liver tonic	P. Meena Prabha V et al., 2014.
<i>Delonix regia</i>	Caesalpinaceae	Whole plant	70% ethanol	anthocyanin	Female adult albino rats (Wister strain) (180-220 g)	CCl ₄ : olive oil (1:1, 2 ml/kg, s. c 2ml/kg p.o	AST, ALT, ALP, ALB, TLP, DBIL & TBIL	Anthelmintic, antimicrobial, anticancer, emetic, CNS depressant and in the treatment of anemia and fever Anthelmintic, Antimicrobial, Anticancer, Emetic, CNS depressant and in the treatment of anemia and fever	Jameel Ahmed et al., 2011
<i>Elytraria acaulis</i>	Acanthaceae	whole fresh plant	Hydro alcoholic	--	Albino rats (Wistar strain - Rattus norvegicus) (200 to 230g)	CCl4 (Carbon tetra chloride) was given I.P (1ml/ kg)	SGPT, SGOT, ALP and Bilirubin, Albumin, Total Protein and Total Bilirubin	Asthma, Migraine, Snake bite, Mammary tumor	G. Venkat Raji Reddy et al., 2015
<i>Smilax Zeylanica</i>	Smilacaceae	Roots and rhizomes	Petroleum Ether, Chloroform and Methanol,	Steroidal Saponin Glycosides Dioscin, Diosgenin, Smilagenin And Sarsapogenin	Albino Wistar rats of either sex 7-8 weeks old, weighing 175-200 g	CCl4 0.5 ml/kg, p.o	ALT, AST, ALP, total bilirubin and albumin	rheumatism and pain, ritual healing techniques and in bloodless dysentery, fever, headache and wounds	Anita Murali et al , 2012
<i>Ricinus communis</i>	Euphorbiaceae	Aerial parts	Ethanol	—	Wistar rats	CCl ₄ : olive oil 1:1, 2 ml/ kg	AST and ALT	laxative	A. Naveen1, Shankar J et al., 2016
<i>Achilleabiebersteinii Afan</i>	Asteraceae	Whole plant	Ethanol	Total phenols	Female Wistar-albino rats (150-200 g) p	2.5 ml/kg bw., p.o	AST-aspartate transaminase, ALT-alanine transferase, ALP alkaline phosphatase] and liver GSH [glutathione] and CAT [catalase]	Fever, Cold and Infectious Diseases Including Influenza, Gastrointestinal Disorders, Prevention of Inflammation of The Gastric and Biliary Disorders	Sanem Hosbas et al.,2011

<i>Polygala rosmarinifolia</i>	Polygalaceae	Leaves	95% Ethanol	Alkaloids, coumarin, glycosides, flavonoids, saponins, steroids, phenols, tannins, and xanthoproteins	male Wistar albino rats (180- 240g)	2ml/kg bw., s.c	SGOT, SGPT and ALP	Anticancer, antidiabetic, anti-inflammatory, anti-fertility and antioxidant activity	M.Alagam maet al., 2013
<i>Pisonia aculeate</i>	Nyctaginaceae.	Leaves	95% Ethanol	Alkaloid, flavonoids, steroids and terpenes	Swiss albino mice (20-25 g) and male Wistar rats (150-200 g)	CCl ₄ 2 ml/kg	AST, ALT, ALP, γ -glutamate transpeptidase (GGTP), total bilirubin and total protein	Inflammation, swelling, cough and tumours. counter irritant for swelling and rheumatic pain	MuthuGou nder et al., 2008
<i>Melia azedarach</i>	Meliaceae	Leaves	Ethanol	Alkaloidal, steroids, tannins, carbohydrates, phenols, flavonoids and terpenes	Wistar albino rats (150-200 gm) of both sex	CCl ₄ 1 ml/kg bw., p.o	SGOT, SGPT, total bilirubin and direct bilirubin	Leprosy, inflammation, analgesic and cardiac disorder	Mohammed Fazil Ahmed et al., 2012
<i>Cassia italica</i>	Fabaceae	Leaves and latex	Ethanol	--	Male Wistar strain albino rats weighing between 150-180gm	CCl ₄ 2ml/kg	AST, ALT, glucose creatinine and urea	Diabetes	Nadro. et al., 2014
<i>Cinnamomum zeylanicum</i>	Lauraceae	Leaves	Ethanol	Flavonoids, Glycosides, Coumarins, Alkaloids, Anthraquinone, Steroids, Tannins and Terpenoids	Adult male Wistar rats weighing 200-230 g	CCl ₄	ALT, AST, ALP & total protein, superoxide dismutase (SOD) and catalase (CAT)	Antimicrobial, insecticidal and antimutagenic	Akram Eidi et al., 2011
<i>Calotropis procera</i>	Apocynaceae	Leaves and latex	Ethanol	Glycosides, Saponins and Terpenes, Alkaloids, Flavonoids	male albino rats, weighting 150-200 gm	CCl ₄ (2 ml/kg, s.c) twice a week in a 7day period	Serum SGOT, SGPT, ACP, ALP, total protein, Albumin and total bilirubin levels	Skin ailments treatment, cure for abdominal viscera enlargements and de-worming agent, Cutaneous mycosis (ringworm), leprosy and syphilitic sores	Ali Ismaiel Ali AbdAlrheam et al., 2015
<i>Eclipta alba</i>	Asteraceae	Leaves	Chloroform or Ethanol	—	Male albino rats	CCl ₄ at a dose of 2 ml/kg intraperitoneally (i.p)	ALT, ASP, ALP, total serum bilirubin, and serum protein.	Hepatoprotective activity	Beedimani RS et al, 2015
<i>Azimatetra cantha</i>	Salvadoraceae	Leaves	Hydroalcoholic mixture (ethanol and water in 1:1 proportion)	Flavonoids, amino acids, tannins, saponins and alkaloids,	Albino rats weighing 130-150 g	100 mg/kg b.w of ferrous Sulfate	Sugar, Bilirubin, protein, Albumin, Globulin, A/G And Alkaline Phosphatase	Diuretic, Used to Treat Dropsy, dyspepsia, chronic diarrhea and as a stimulant tonic	Sambasiva Manikanda selvi et al, 2013
<i>Clausenae marginata</i>	Rutaceae	Stem	95% Ethanol	Pyranocoumarins, clauemarmarins	The WB-F344 cell lines	Galactosamine-induced damage in wb-f344 cells at the concentration of 10 μ m	—	Clauemarmarin A Clauemarmarin B	Hong-Min Xia et al., 2016
<i>Potentilla anserina</i>	Rosaceae	Tuberous Roots	Methanol	Tannins flavan-3-ols and flavonoids triterpenes Glycosides, Polysaccharides, and amino acids	Male ddY mice	D-GalN	Serum AST and serum ALT levels were determined using Transaminase CII	Malnutrition, anemia, diarrhea, and haemorrhage	Toshio Morikawa et al, 2014
<i>Lepidium sativum</i>	Brassicaceae	Seed	Ethanol	Glucosinolates such as benzyl isothiocyanate, benzeneacetone nitrile and phenolic content	Wistar male rats (180-205 g)	D-GalN/LPS (400 mg/kg and 30 μ g/kg, i.p.)	Caspase 3 and up-regulates the BCL2 protein expression	—	Raish et al. ,2016
<i>Allium cepa</i>	Liliaceae	Bulb	Aqueous	Steroids, Tannins, Flavonoids, Saponins, Alkaloids, Carbohydrates, Glycosides, Proteins, Fats And Oils	Adult male albino Wistar rats (180 \pm 20 g)	Ethanol 3.76 g/kg bw, orally) for 25 days	AST & ALP and total bilirubin	Intestinal Infections, Eye Infections, Ear Ache, Urinary Tract Burning, Headaches Associated With Drowsiness, Ulcers On Heels And Cough	K. Eswar Kumar et al., 2013

<i>Picrorhiza kurroa</i>	Scrophulariaceae	Dried Rhizome	Distilled Water	Kutkin is the active principle of <i>P. kurroa</i> and comprises kutkoside and the iridoid glycosides, picrosides I, II, and III Apocynin is a catechol phenolic and flavonoid contents	Adult Swiss albino mice (6-8 weeks old) of either sex,	Ethanol	LDH, GOT and GPT, DPPH and ferrylmyoglobin, and reducing ability by FRAP along with lipid peroxidative	inflammatory agent highly cytotoxic and they possess antitumour effects traditionally been used to treat disorders of the liver and upper respiratory tract.	Sinha, et al.: 2011
<i>Adina cordifolia</i>	Rubiaceae	Leaves	Aqueous, Acetone	7-hydroxycoumarin-1 and 7-β-Dglucosylcoumarin-2	Wistar rats of either sex	Ethanol	SGOT, alkaline phosphate and total bilirubin	Antiamoebic activity liver disorders antiulcer potential activity, antifertility activity, anti-inflammatory and antinociceptive activity	A Sharma et al., 2012.
<i>Chenopodium AMBROSIODES</i> var. <i>AMBROSIODES</i>	Chenopodiaceae	Leaf	Ethanol & Hexane extract	Polyphenols, Terpenes, Terpenoids, and cardiac glycosides.	Male Wistar rats (120-30g)	Mercury chloride- 3.75mg/kg	Total protein, albumin, total bilirubin, direct bilirubin, catalase, glutathione peroxidase (GPx), reduced glutathione (GSH), creatinine, uric acid, urea, ALT and AST	Hepatoprotective Antipyretic, Antimicrobial, Antioxidant, Cancer Chemoprotective, And Antidiabetic Nephro Protective, Anti-Inflammatory	Gbenga S et al., 2020
<i>Praecitrullu fistulosus</i>	Cucurbitaceae	Fruit	Methanol	---	Mice Model	Carbon Tetrachloride (Ccl4)	--	Anti-Inflammatory, Antioxidant, Anti Helmenthic Antidiabetic Activity	C.S. Madhu, et al. 2019
<i>Plantago Ovata</i>	Plantagenaceae	Husk	Aqueous Extract	---	Adult Male Albino Rats of Wistar Strain (200-250 G)	Indomethacin 48 Mg/Kg	TNF-A Protein	Antiulcer and Hepatoprotective Effects	Seyyed Majid Bagheri et al, 2018
<i>Calotropis procera</i>	Asclepiadaceae	---	Chloroform	---	Male albino rats 150-200 g	Carbon tetrachloride	SGOT, SGPT, ACP, ALP, total protein, Albumin and total bilirubin	---	Ali et al, 2015
<i>Lycium europaeum</i>	--	Leaves	n-hexane, chloroform, ethyl acetate, n-butanol and water to obtain LEH, LEC, LEEA, LEB and LEW fractions	--	Wistar male mice about 25-27 g body weight (BW)	Carbon tetrachloride	--	Anti-Tumor, Anti-Inflammatory, Nociceptive, Hepatoprotective And Nephroprotective Effects	I. Rjeibi et al. 2017
<i>Cassia singueana</i>	Caesalpinaceae)	Root	Methanol		Wistar strain of male Albino rats, body weight ranging from 160-200 g	carbon tetrachloride	CAT & SOD		Ottu OJ et al, 2013
<i>Capparis spinosa</i>		Leaf	Hydro-Ethanollic		Healthy mature Swiss albino male mice (35-40 g)			diabetes, hypertension & kidney diseases	M. Tir et al. 2019
<i>Melastoma malabathricum</i>		Leaf	Methanol		Adult Male Sprague-Dawley Rats Weighing 180e200 G	Carbon Tetrachloride and Paracetamol	AST & ALT	Antioxidant and Anti-Inflammatory Activities	F.H. Kamisan et al, 2013
<i>Zanthoxylum armatum</i>		Whole plant	Ethyl Acetate, Chloroform and Methanol	Phytosterols, Terpenoids, Glycosides, Saponins, Flavonoids, Tannins,	outbred Wistar albino rats (180-250 g)	Paracetamol	AST/ALT/A LP/total bilirubin	leaves exhibited anticonvulsant and antispasmodic, stem bark was cytotoxic and	Talluri et al, 2019.

				Carbohydrates, Alkaloids, Amino acids, Oils, Quinones & Phenols				antioxidant. It is used as an aromatic tonic in fever and dyspepsia, toothache, rheumatism and as a lotion for scabies	
<i>Hostaplagina (Lam.) Aschers</i>	Liliaceae	Flower	Ethanol	Flavonol-Lignan Heterodimers	Human L-O2 Cells	CCl4	--	Anti-Prostate Cancer	R. Wei, et al. 2020
<i>Garcinia Mangostana Peel</i>	Clusiaceae	Peel	Ethanol	--	Sprague Drawly (SD) Rats.	. Thioacetamide	AST, ALP & ALP	Urinary Tract Infections (Utis), Diarrhea, Eczema, Ulcers, Obesity and Gastrointestinal Disorders	W.N. Abood, et al. 2020
<i>Origanum Elongatum</i>	Lamiaceae	Leaves	Methanol	Flavonoid Content and Phenolic Content	Adult Wistar Albino Rats Weighing 190 - 250 G	CCl4 (0.6 ml/Kg, Bw	AST, ALP & ALP	Diarrhea, Respiratory Infections and Urinary Tract Infections and Food Preservative	B. Douhri et al, 2014
<i>Eichhornia Crassipes</i>	Pontederiaceae	Leaves	Ethanol	Tannins, Flavonoids, Alkaloids and Saponins. Alkaloids and Flavonoids	Male Albino Rats Weighing Between 150-220 Gm	CCl4 1 ml/Kg, (I.P.)	Serum SGPT, SGOT, ALP and Bilirubin	Antimicrobial Activity, Antiviral, Antibacterial and Anticancer Agents	Dineshkumar et al. 2013
<i>Asparagus Racemosus</i>	Liliaceae	Roots	Aqueous Extract	-	Albino Rats of Either Sex (150-200 Gm)	CCl4 (1 ml/Kg, P.O.)	AST, ALP and Total Bilirubin	Immunomodulatory Activity, 4 Antiulcer Activity, 5 Antioxidant Activity, 6 Hypolipidemic Activity, Anti-Cancer	Mohthash Musambil et al, 2015
<i>Vitex Glabrata</i>	Verbenaceae	Leaves	Ethanol	Phenolics/Flavonoid	Rats	Carbon Tetrachloride	AST, ALT, ALP and Total Bilirubin	Anthelmintic, Astringent, Stomachic and Sexual Enhancer. Wound Healing and in treatment Of Gastrointestinal Disorders	V.K. Sridevi et al, 2012
<i>Polygonum Orientale</i>	Polygonaceae	Fruits	Ethanol	Flavonoids Are Taxifolin And Quercetin. Phenolics Such as Gallic Acid and Protocatechuic Acid	Male Mice (20 ± 2 G)	Intraperitoneal Injection of Ccl4 (10 ml/Kg BW, 0.175% In Olive Oil)	ALT And AST	Anti-Inflammatory, Antifibrosis, Antioxidative, Anticancer, Immune-Stimulating, Swelling-Subsiding, Anti myocardial Ischemic, And Vasodilating Activities,	Wen-Huang Peng et al, 2017
<i>Stachys Ptilifera</i>	Lamiaceae	Aerial Parts	Ethanol	--	Adult Male Wistar Rats Weighing 180-220 G	Ccl4 As A 50% Solution in Olive Oil (1 ml/Kg Twice A Week)	ALT, AST and ALP	Infectious Diseases, Respiratory and Rheumatoid Disorders in Iranian Folk Medicine. Antitumor and Antioxidant Activity	Esmaeel Panahi Kokhdan, et al, 2017
<i>Avicennia Marina</i>	Avicenniaceae	Leaves	Ethanol	Alkaloids, Phenolics, Steroids, Terpenoids	Male Albino Wistar Rats Weighing 170-210g	1 ml Of 20% Alcohol For 21 Days	SGOT, SGPT, ALP, GGT, Total Bilirubin and Total Protein	Ulcers and Skin Diseases, Skin and Toothache Diseases. Anti-Inflammatory, Anti-Carcinogenic and Anti-Atherosclerotic Activities	Vellimalai et al 2019
<i>Ficus Carica Linn.</i>	Moraceae	Leaves	Ethanol	Sterols, Flavonoids, Furano Coumarins and Triterpenes	Albino Rats of Either Sex	50% (V/V) Ccl4 In Olive Oil in A Single Dose Of 2 ml/Kg Body Weight	SGOT, SGPT, TP, TA, ALKP And the Level of Total Serum Bilirubin	Furanocoumarins Such as Psoralen, Bergapten, Xanthoxi, Triterpenes Such as Calotropenyl Acetate, Lupeol Acetate, Isoschaftoside	Mohd Mujeeb, et al, 2011

								And Certain Sterols.	
<i>Sphaeranthus Indicus</i>	Asteraceae	Flower Heads	Methanol	Alkaloid Sphaeranthine and an Isoflavone 5,4'-Dimethoxy-3'-Prenylbiochanin	Male Albino Rats of Either Sex Weighing 180±20g	Acetaminophen	SGPT And SGOT Enzyme	Epilepsy and Mental Disorder also Cures Piles, Hepatitis	Brijesh.K. Tiwari et al. 2009.
<i>Phyllanthus Niruri</i>	Euphorbiaceae	Herb	Alcoholic Extract	--	Rats	Paracetamol Induced Hepatocellular Degenerative And S. Aureus Induced Oxidative Stress in the Rat Liver model	Serum Bilirubin, SGOT, SGPT and ALP	Bacterial Infections	V. Ramamurthy et al. 2014

CONCLUSION

This review provides a knowledge on the list of Hepato protective plants of Innumerable herbal plants against hepatotoxicants. The hepatoprotective action is likely related to its potent antioxidative and anti-inflammatory activity. These data provide a scientific explanation for the folkloric practices of in the treatments of hepatic disorders. The discoveries provide a basis for further studies on pharmacological evaluation.

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