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HEPATOPROTECTIVE PLANTS IN WESTERN GHATS

KULKARNI P[1*], SURYAWANSHI A[1] AND KHAN A[2]

Department of Pharmacy, Vivekananda Education Society College of Pharmacy, Mumbai, Maharashtra, India

Department of Pharmacology, Vivekananda Education Society College of Pharmacy, Mumbai, Maharashtra, India

***Corresponding Author: Ms. Priyanka Kulkarni: E Mail: psk270700@gmail.com**

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ABSTRACT

Liver is a major victim of drug toxicity as hepatocytes are exposed to higher concentration of nascent metabolites formed by cytochrome P_{450} dependent during oxidation. So, the aim of the study is to enumerate the plants available in Western Ghats that show hepatoprotective activity. The article presents information of biological source, family, phytochemicals, plants part used, extract type, Model, Animal used of individual plant. The herbal plants discussed are cheap, mild side effect, less toxic, more potent, natural and safe.

Keywords: Liver, Natural product, Medicinal Herb, Plant Extracts, Hepatoprotective plant, Western Ghats

INTRODUCTION

Liver is the one of the largest organ in human body and chief function is metabolism and excretion. It has role in maintenance performing and regulating homeostasis of body. It is involved in almost all biological pathways, to growth, fight against toxin nutrient supply, energy provision. Liver is major victim of drug toxicity because hepatocytes are exposed to high concentration of nascent metabolites as these are formed by cytochrome P_{450} dependent during oxidation. Hepatotoxicity implies chemical driven liver damage .Liver damage is mainly caused by dry cleaning solvent Carbon tetrachloride, a substance called Vinyl chloride which is used to make plastics, industrial chemicals called Polychlorinated biphenyls. Drugs like Acetaminophen (Tylenol), Azathioprine (Imuran), Isoniazid, Diclofenac, Amoxicillin, are most toxic to liver. Approximately 75% of idiosyncratic/ synthetic drug reactions results in liver toxicity or liver transplantation or liver death. Drug induced hepatic injury is the most common reason cited for withdrawal of an approved drug. Mechanism of hepatotoxicity most of hepatotoxic chemicals damage liver cells mainly by inducing lipid peroxidation and other oxidative damage which include forming reactive free oxygen radicals which directly induces hepatotoxicity or increasing apoptosis or reducing glutathione stores of an antioxidant system of human body or covalent bonding. Chemical driven synthetic drugs have reported adverse effect so we can go for ayurvedic plants available in Indian traditional system. The traditional medicine refers to broad range of ancient natural health care practice including Ayurveda, Siddha, Unani System of medicine. The risk associated with medicinal herb is very low. The use of natural remedies for treatment of liver disease has long history and medicinal plant and their derivatives are used all over the world. Now day's polyherbal formulations are available for treatment of liver dysfunction. This review article has been presented to enumerate the plants available in Western Ghats.

Table 1: Hepatoprotective Activity of Plants									
S. No.	Name	Family	Biological source	Phytochemicals	Extract Type	Model	Plant part	Animal used	Indication
1.	Turmeric [2]	Zingiberaceae	Curcuma longa	Curcumin, Saponin, Alkaloid, Phenol, Flavonoids	Ethanol	Thioacetamide Induced	Rhizome	Sprague Dawley	Antioxidant And Anti-inflammatory Anorexia, Dyspepsia [3]
2.	Cardamom [4]	Zingiberaceae	Elettaria cardamom	Terpenoid, Flavonoid, Glycoside, Cineol, Volatile oil	Aqueous	Gentamicin Induced	Seed	Albino Rats	Antioxidant [5] Anti-inflammatory [6]
3.	Mango [7]	Anacardiaceae	Magnifera indica	Mangniferin, GallicAcid, Gallotanin, Ellagic Acid,	Ethanol Methanol	Mercuric Hydrochloride ($HgCl_2$)	Leaves	Swiss Albino Mice	Antioxidant [8] Anti-inflammatory Gastro protective abilities [9]
4.	Sadabahar [10]	Apocynaceae	Catharanthus roseus	Vinicristine, Viniblastine, Saponin, Glycoside, Carbohydrate	Ethanol	Paracetamol induced	Leaves	Wister Albino Rats	Anti-Diabetic [11] Anti-ulcer Anti-hyperlipidaemic [12]
5.	Amla [13]	Phyllanthaceae	Embelica officinalis	Tannin, Alkaloid, Polyphenol Emblicanin A and B, Ascorbic Acid	Ethanol	Carbon tetrachloride (CCl4)	Fruit	Albino Rats	Antioxidant [14] Anti-inflammatory Neuroprotective. Anti-bacterial [15]
6.	Curry leaf [16]	Rutaceae	Murraya koeniggi	Alkaloid, flavonoid, Phenolic Substance	Hydro alcoholic Extract	Carbon tetrachloride CCl_4 induced	Bark	Swiss Albino Rats	Anticancer [17] Anti-inflammatory. Anti-diabetic [18] Antioxidant
7.	Tulsi [19]	Lamiaceae	Ocimum sanctum	Eugenol, Linalool, Linoleic Acid, Oleanalic Acid	Alcoholic,Aqueous	Carbon tetrachloride CCl_4 induced	Leaves	Albino Rats	Antioxidant Anti- inflammatory [20] Anti-Cholinesterase Anticonvulsant [21]
8.	Chandan [22]	Santalaceae	Santalum album	Alkaloid, flavonoid, Glycoside, Mucilage	Hydroalcholic extract	ParacetamolInduced	Stem	Wistar Rats	Antioxidant [23] Anticancer Ant fibrosis [24]
9.	Harda [25]	Combreeetaceae	Terminaliachebula	Polyphenol, Terpenten, Anthocyanin, Glycoside	Aqueous Ethanol	Ethanol induced	Fruit	Wistar Rats	Analgesic and Anti-inflammatory [26] Anti-diabetic Reno protective [27]
10.	Adrak [28]	Zingiberaceae	Zingiber officinale	Unsaturated Sterol, Saponin, Triterpenten Nitrogen Bases	Methanol	Carbon tetrachloride CCl_4	Rhizome	Sprogue Dawley Albino Rat	Antioxidant [29] Anticancer Anti-inflammatory [30]
11.	Water Lily [31]	Nymphaeaceae	Nelumbo nucifera	Procyanadin, Polyphenol, Flavonols, Polysaccharide	Aqueous Ethanolic extract	Paracetamol Induced & Carbon tetrachloride CCl_4 induced	Flower.	Sprogue Dawley Rat	Antioxidant [32] Anticancer [33]
12.	Ashoka [34]	Caesalpibiaceae	Saraca ashoka	Saponin, Tannin, Glycoside Steroid, Phenol, Carbohydrate	Methanolic & Hydro alcoholic.	Carbon tetrachlorideCCl$_4$ induced	Bark	Wister Albino Rats	Antioxidant [35] Anti-breast cancer Cardio protective [36]
13.	Sarpagandha [37]	Apocynaceae	Rauwalfia serpentina	Serpentina Alkaloid, Saponin, Tanin, Flavonoid, Steroid, Phenol	Aqueous Ethanolic extract	Paracetamol Induced	Rhizome	Albino Rats	Antioxidant [38] Anticancer Anti-diarrhoeal [39]

CONCLUSION

The aim of the study was to enumerate the plants available in Western Ghats that showed Hepatoprotective activity. Herbal and traditional botanical products have been used since ancient times for treatment of various disorders and diseases. The herbal plants discussed have showed effective hepatoprotective activity. Herbal therapies are free from side effects and toxicity unlike allopathic chemical driven synthetic drugs. These are less costly, mild side effects, more potent, natural and safe. Combination of two or more plant herbs maybe sometimes more effective than individual drug. The phytochemicals can be further evaluated and studied for treatment of various diseases.

REFERENCES

[1] Kumar CH, Ramesh A, Kumar JS, Ishaq BM. A review on hepatoprotective activity of medicinal plants. International journal of pharmaceutical sciences and research. 2011 Mar 1; 2(3):501.

[2] Salama, Suzy M., Mahmood Ameen Abdulla, Ahmed S. AlRashdi, Salmah Ismail, Salim S. Alkiyumi, and Shahram Golbabapour. "Hepatoprotective effect of ethanolic extract of Curcuma longa on thioacetamide induced liver cirrhosis in rats." *BMC complementary and alternative medicine* 13, no. 1 (2013): 1-17.

[3] Duke, James A. "The garden pharmacy: turmeric, the queen of COX-2-inhibitors." *Alternative & Complementary Therapies* 13, no. 5 (2007): 229-234

[4] Aboubakr, Mohamed, and Abdelazem Mohamed Abdelazem. "Hepatoprotective effect of aqueous extract cardamom against gentamicin induced hepatic damage in rats." *Int J Basic Appl Sci* 5, no. 1 (2016): 1.

[5] Goyal, Sameer N., Charu Sharma, Umesh B. Mahajan, Chandragouda R. Patil, Yogeeta O. Agrawal, Santosh Kumari, Dharamvir Singh Arya, and Shreesh Ojha. "Protective effects of cardamom in isoproterenol-induced myocardial infarction in rats." *International journal of molecular sciences* 16, no. 11 (2015): 27457-27469.

[6] Daneshi-Maskooni, Milad, Seyed Ali Keshavarz, Mostafa Qorbani, Siavash Mansouri, Seyed Moayed Alavian, Mahtab Badri-Fariman, Seyed Ali Jazayeri-Tehrani, and Gity Sotoudeh. "Green cardamom increases Sirtuin-1 and reduces inflammation in overweight or obese patients with non-alcoholic fatty liver disease: a double-blind randomized placebo-controlled clinical trial." *Nutrition & metabolism* 15, no. 1 (2018): 1-12.

[7] Karuppanan, Muthupillai & Krishnan, Manigandan & Padarthi, Pavankumar & Namasivayam, Elangovan. Hepatoprotective and Antioxidant Effect of *Mangifera indica* Leaf Extracts against Mercuric Chloride-induced Liver Toxicity in Mice. Euroasian

Journal of Hepato-Gastroenterology (2014). 4. 18-24. 10.5005/jp-journals-10018-1091.

[8] Dorta, Eva, M. Gloria Lobo, and Mónica González. "Using drying treatments to stabilise mango peel and seed: Effect on antioxidant activity." *LWT-Food Science and Technology* 45, no. 2 (2012): 261-268.

[9] sStohs, S. J., A. Swaroop, H. Moriyama, M. Bagchi, T. Ahmad, and D. Bagchi. "A review on antioxidant, anti-inflammatory and gastroprotective abilities of mango (Mangifera indica) leaf extract and mangiferin." *J. Nutr. Health Sci* 5 (2018): 303.

[10] Srinivasa, R. A., and M. F. Ahmed. "Phytochemical Evaluation And Hepatoprotective Activity Of *Catharanthus rosea* Against Simvastatin-Induced Hepatotoxicity In Rats." *Int J Adv Pharm Med Bioallied Sci* 1 (2013): 7-11.

[11] Oguntibeju, Oluwafemi Omoniyi, Yapo Aboua, and Mediline Goboza. "Vindoline—A Natural Product from *Catharanthus roseus* Reduces Hyperlipidemia and Renal Pathophysiology in Experimental Type 2 Diabetes." *Biomedicines* 7, no. 3 (2019): 59.

[12] Rambhai, Pahadiya Anitakumari, S. S. Sisodia, Arijit Chaudhuri, and Arpit Patidar. "Antiulcer and Antihyperlipidaemic Efficacy of *Catharanthus roseus* Leaves on pylorus ligation induced Ulcer in Experimental Animals." *Pharmaceutical and Biosciences Journal* (2019): 07-12

[13] Deori, Chinmoyee, Swarnamoni Das, and Sushanta Kumar Bordoloi. "Study of hepatoprotective activity of *Emblica officinalis* (AMLA) in Albino rats." *J Evid Based Med Healthc* 4, no. 54 (2017): 3298-301.

[14] Golechha, Mahaveer, Jagriti Bhatia, Shreesh Ojha, and Dharmveer Singh Arya. "Hydroalcoholic extract of *Emblica officinalis* protects against kainic acid-induced status epilepticus in rats: evidence for an antioxidant, anti-inflammatory, and neuroprotective intervention." *Pharmaceutical biology* 49, no. 11 (2011): 1128-1136.

[15] Ramesh, P. S., T. Kokila, and D. Geetha. "Plant mediated green synthesis and antibacterial activity of silver nanoparticles using *Emblica officinalis* fruit extract." *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy* 142 (2015): 339-343.

[16] Pande, M. S., S. P. B. N. Gupta, and A. Pathak. "Hepatoprotective activity of *Murraya koenigii* Linn bark." *Journal of Herbal Medicine and Toxicology* 3, no. 1 (2009): 69-71

[17] Iman, Venoos, Syam Mohan, Siddig Ibrahim Abdelwahab, Hamed Karimian, Noraziah Nordin, Mehran Fadaeinasab, Mohamad Ibrahim Noordin, and Suzita Mohd Noor. "Anticancer and anti-inflammatory activities of girinimbine isolated from *Murraya*

koenigii." *Drug design, development and therapy* 11 (2017): 103

[18] Husna, Fauzul, Franciscus D. Suyatna, Wawaimuli Arozal, and Erni H. Poerwaningsih. "Anti-Diabetic Potential of *Murraya koenigii* (L.) and its antioxidant capacity in nicotinamide-streptozotocin induced diabetic rats." *Drug research* 68, no. 11 (2018): 631-636.

[19] Lahon, Kingshuk, and Swarnamoni Das. "Hepatoprotective activity of *Ocimum sanctum* alcoholic leaf extract against paracetamol-induced liver damage in Albino rats." *Pharmacognosy research* 3, no. 1 (2011): 13

[20] Mondal, Shankar, Bijay R. Mirdha, and Sushil C. Mahapatra. "The science behind sacredness of Tulsi (*Ocimum sanctum* Linn.)." *Indian J Physiol Pharmacol* 53, no. 4 (2009): 291-306.

[21] Manu, Gangadhar, Shivaraju Thiruganahalli Padmanabha, Thippeswamy Chandrakantha, and Manchukonda Ravishankar. "Evaluation of anticonvulsant activity of ethanolic extract of leaves of *Ocimum sanctum* (tulsi) in albino rats." *National Journal of Physiology, Pharmacy and Pharmacology* 7, no. 7 (2017): 762

[22] Vengal Rao, P., C. K. Ashok Kumar, G. Ashwini, R. Ambareesh Kumar, and S. Sangeetha. "Evaluation of Hepatoprotective Activity of *Santallum Album* (Stem) Against Paracetamol Induced Hepatotoxicity in Albino Wistar Rats." (2014). 370-373.

[23] Misra, Biswapriya B., and Satyahari Dey. "Phytochemical analyses and evaluation of antioxidant efficacy of in vitro callus extract of east Indian sandalwood tree (*Santalum album* L.)." *Journal of Pharmacognosy and Phytochemistry* 1, no. 3 (2012): 7-16.

[24] JiYoung, H. W. A. N. G., K. W. O. N. SeungHwan, H. O. N. G. SaIk, J. U. N. G. YangHee, K. I. M. MinJung, M. A. ShiXun, O. H. JiHwan, J. O. O. Hyun Joong, L. E. E. SeokYong, and J. A. N. G. ChoonGon. "The Heartwood of Santalum album. Lin. Improves Learning and Memory Impairments Induced by Scopolamine via Inhibition of Cholinergic Dysfunction in Mice." *추계총회 및 학술대회* (Fall general meeting and academic conference), (2012): 255-255.

[25] Balakrishna, V., and T. Lakshmi. "Hepatoprotective activity of ethanolic extract of *Terminalia chebula* fruit against ethanol induced hepatotoxicity in rats." *Asian Journal of Pharmaceutical and Clinical Research* (2017): 55-58.

[26] Nigam M, Mishra AP, Adhikari-Devkota A, Dirar AI, Hassan MM, Adhikari A, Belwal T, Devkota HP. Fruits of *Terminalia chebula* Retz.: A review on traditional uses, bioactive chemical constituents and pharmacological activities. Phytotherapy Research. 2020 Oct;34(10):2518-33

[27] Rao, Nalamolu Koteswara, and Srinivas Nammi. "Antidiabetic and renoprotective

effects of the chloroform extract of *Terminalia chebula* Retz. seeds in streptozotocin-induced diabetic rats." *BMC complementary and alternative medicine* 6, no. 1 (2006): 1-6.

[28] Atta, A. H., T. A. Elkoly, S. M. Mouneir, Gehan Kamel, N. A. Alwabel, and Shaimaa Zaher. "Hepatoprotective effect of methanol extracts of *Zingiber officinale* and Cichorium intybus." *Indian journal of pharmaceutical sciences* 72, no. 5 (2010): 564.

[29] Oke, Gracious Oluwamayowa, Adegboyega Adeleke Abiodun, Christian Eseigbe Imafidon, and Barinem Fortune Monsi. "*Zingiber officinale* (Roscoe) mitigates CCl4-induced liver histopathology and biochemical derangements through antioxidant, membrane-stabilizing and tissue-regenerating potentials." *Toxicology reports* 6 (2019): 416-425.

[30] Habib, Shafina Hanim Mohd, Suzana Makpol, Noor Aini Abdul Hamid, Srijit Das, Wan Zurinah Wan Ngah, and Yasmin Anum Mohd Yusof. "Ginger extract (*Zingiber officinale*) has anti-cancer and anti-inflammatory effects on ethionine-induced hepatoma rats." *Clinics* 63 (2008): 807-813.

[31] Rao, G.M.M. &Pushpangadan, P. &Shirwaikar, Annie. Hepatoprotective activity of NelumbonuciferaGeartn. Flower: An ethnopharmacological study. Acta Pharmaceutica Turcica. (2005). 47. 79-88.

[32] Rai, Sujay, Atul Wahile, Kakali Mukherjee, Bishnu Pada Saha, and Pulok K. Mukherjee. "Antioxidant activity of Nelumbo nucifera (sacred lotus) seeds." *Journal of ethnopharmacology* 104, no. 3 (2006): 322-327.

[33] Yoon, Jin-Soo, Hwa-Mi Kim, Anandam Kasin Yadunandam, Nan-Hee Kim, Hyun-Ah Jung, Jae-Sue Choi, Chi-Yeon Kim, and Gun-Do Kim. "Neferine isolated from Nelumbo nucifera enhances anti-cancer activities in Hep3B cells: molecular mechanisms of cell cycle arrest, ER stress induced apoptosis and anti-angiogenic response." *Phytomedicine* 20, no. 11 (2013): 1013-1022.

[34] Arora, Bharti, Manjusha Choudhary, Preeti Arya, Sunil Kumar, Nitesh Choudhary, and Surender Singh. "Hepatoprotective potential of *Saraca ashoka* (Roxb.) De Wilde bark by carbon tetrachloride induced liver damage in rats." *Bulletin of Faculty of Pharmacy, Cairo University* 53, no. 1 (2015): 23-28.

[35] Wetwitayaklung, P., T. Phaechamud, C. Limmatvapirat, and S. Keokitichai. "The study of antioxidant activities of edible flower extracts." In *International Workshop on Medicinal and Aromatic Plants 786*, pp. 185-192. 2007.

[36] Swamy AV, Patel UM, Koti BC, Gadad PC, Patel NL, Thippeswamy AH. Cardioprotective effect of *Saraca indica* against cyclophosphamide induced cardiotoxicity in rats: A biochemical,

electrocardiographic and histopathological study. Indian journal of pharmacology. 2013 Jan;45(1):44

[37] Gupta, Ajay K. "Hepatoprotective activity of *Rauwolfia serpentina* rhizome in paracetamol intoxicated rats." *J Pharmacol Toxicol* 1 (2006): 82-88.

[38] Harisaranraj, R., K. Suresh, S. Saravanababu, and V. Vaira Achudhan. "Phytochemical based strategies for pathogen control and antioxidant capacities of *Rauwolfia serpentina* extracts." *Recent Research in Science and Technology* 1, no. 2 (2009).

[39] Ezeigbo, I. I., M. I. Ezeja, K. G. Madubuike, D. C. Ifenkwe, I. A. Ukweni, N. E. Udeh, and S. C. Akomas. "Antidiarrhoeal activity of leaf methanolic extract of *Rauwolfia serpentina*." *Asian Pacific Journal of Tropical Biomedicine* 2, no. 6 (2012): 430-432.