

A mini review on some hepatoprotective phytochemicals and herbs

Rajani Singh

Department of Chemistry, T.D.P.G. College, Jaunpur-222002, U.P. (India)

Email : drssingh20.ss@gmail.com

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Abstract : The liver is a very important organ of our body. The main role of liver in body is detoxification and metabolism. The fatty liver, hepatitis, cirrhosis and liver cancer are dangerous diseases of liver. The liver diseases are mainly caused by viruses or excessive consumption of alcohol. The synthetic drugs sometimes result severe side effects, hence medicines from natural sources with lesser side effects are considered globally for the treatment of liver diseases. The herbal medicines must be used with the consultation of Ayurvedic medicines practitioners.

(Keywords : Liver disease, Herbal, phytochemicals Hepatoprotective.)

Introduction

The Liver is internal organ of our body. It filters the blood and removes toxins and other xenobiotics. It metabolises carbohydrate, fat and proteins. It produces hormonal plasma proteins¹ and also bile which is helpful in digestions. Liver is notable for excretion of bilirubin. Some common liver diseases are hepatitis (A, B, C), fatty liver, cirrhosis, jaundice, fibrosis, hepatocellular carcinoma etc.

The herbal medicines have been used for a very long time for the treatment of liver diseases. The synthetic drugs used for liver diseases have dangerous side effects. Therefore, the treatment with natural products is preferred. A majority of patients in Europe and United States prefer herbal medicines for the treatment of liver diseases². The main causes of liver diseases are excess intake of alcohol, diabetes, high blood pressure, viral infection and drug induced liver

damage. The synthetic drugs interferon, colchicine, penicillamine and cortico steroids used for treating liver diseases, show dangerous side effects. Thus phytochemicals with lesser side effects are found more suitable for treatment of liver diseases. Approximately one hundred sixty phytoconstituents and other phytochemicals have been reported to possess hepatoprotective activity³.

Flora⁴ *et al.*, have reported several phytochemicals like flavonoids, alkaloids, glycosides and saponins present in various plants as hepatoprotective agents. Punarnava (*Boerbovia diffusa*) has been reported to contain rotenoids, flavonoids, glycosides, purene, nucleosides, lignin and steroids in its root⁵. It renews the body and is useful in treatment of jaundice⁶. Carbon tetra chloride induced liver fibrosis in rats, was inhibited by Rhein⁷ (A natural anthraquinone derivative).

Some important herbs and phytochemicals effective in treatment of liver diseases, are given below with their brief descriptions. The informations derived from existing literature have been indicated in the review giving relevant references.

1. Silymarin: Mayer *et al.*⁸, reported *Silybum marianum* (L) Gaertn as the oldest plant used in treatment of liver diseases. This plant is also known as milk thistle. The dry seeds of milk thistle are loaded with silymarin. Its active chemical constituents⁹ are silybin A, silybin B, isosilybin A, isosilybin B, silychristin, neosilychristin,

silydianin and taxifolin. Hepatoprotective properties of silymarin were reported by Pradhan¹⁰ *et al.* Miller¹¹ suggested that silymarin shows antioxidants and free radical scavenging properties. Silymarin stimulates protein synthesis¹² and rejuvenate the normal function of liver and revive the damaged hepatocytes. Silymarin and its constituents are used to treat liver diseases with no injurious effect¹³.

2. Azadiracta Indica: It is commonly used as herbal antibiotics and generally known as Nimba or Neem. Its main chemical constituents¹⁴ are alkaloid, tannins, glycosides, saponins and sugar. The fresh juice of Nimba possesses, free radical scavenging property and thus it is reported to show antioxidant and hepatoprotective property¹⁵. The hepatoprotective property of the aqueous, alcoholic and ethyl acetate extracts of Nimba leaves has been reported¹⁶.

3. Fenugreek (*Trigonella foenum graecum*): Its common name is Methi. This plant is loaded with phytochemicals like flavonoids, polysaccharides, saponins and alkaloids like coline, trionelline, trigocoumarin, diosgenin, 4-hydroxy leucine¹⁷ etc. β -Carotene, calcium and iron are also present in leaves of trigonella. It protects liver tissues. against toxicity¹⁸ induced by detamethrin. Further methanol extract of trigonella shows hepatoprotective properties against hepatotoxicity induced by carbontetrachloride¹⁹.

4. Biacalin: It is extracted from *scutellaria baicalensis georgi* and protects hepatocytes or hepatic parenchymal cells from oxidative stress²⁰. An active compound Baicalein present in *scutellaria baicalensis* George was reported very much effective in liver injury²¹. Its chemical name is 5,6-Dihydroxy-4-oxo-2-phenyl-4-H-1 benzopyran -7-yl- β -D-glycopyranosiduronic acid

5. Andrographolide: It is isolated from *Anadographis paniculata* Nees, known as king of bitter due to highly bitter taste, which is also called as Mahatita in Hindi, green chiretta in

Bengali. The main chemical constituents²² of *A. paniculata* are andrographolide, andrographine, neoandrographolide, 14-deoxy-11-oxo - andrographolide, paniculine, paniculide-A, paniculide-B and paniculide-C. It is water soluble lactone and it shows hepatoprotective activity of *A. paniculata*²³. This plant has antioxidants properties²⁴. As compared to silymarin, it is better hepatoprotective against toxicity induced by paracetamol.

6. Glycyrrhizin: It is main component of *Glycyrrhiza glabra* root. Its chemical name is 20- β -yl-2-O- β -d-glucopyranurosyl- α -d-glucopyranosiduronic acid. It is glycosylated saponin. It has been reported as anti viral agent against hepatitis C virus²⁵. It is used to relieve jaundice and its antifibrotic property is due to its inhibitory property on NF- α β ²⁶.

7. Camptothecin: It is cytotoxic quinoline alkaloid (+) camptothecin²⁷ which is isolated from bark or stem of *camptotheca acuminata* Decne. The *C. acuminata* is a rich source of camptothecins which has shown antitumor properties²⁸. Its chemical name is (S)-4-ethyl-4-hydroxy-1H-pyrano(3',4',6,7)Indozilino [1,2-b] quinoline-3,4-(4H, 12H)-dione. It has been reported as safe and effective therapeutic agent for treatment of liver cancer²⁹.

8. Puerarin: It is a kind of isoflavones isolated from *pueraria lobata*. Its chemical name is 8-(β -D-glucopyranosyl)-4',7-dihydroxy isoflavone. It has been reported effective against liver fibrosis³⁰ induced by CCl₄.

9. Solonum nigrum L.: Its different chemical constituents are glycoalkaloid (Solanine), glycoprotein, polysaccharides, polyphenolic compounds, gallic acid, catechin, protocatechuic acid, caffeic acid, epicatechin, rutin³¹ etc. In the animals treated with ethanolic extract of *S. nigrum*, hepatoprotective effect with lowering of AST, ALT, ALP and bilirubin³² has been reported. Its aqueous methanolic extract shows antiheptic activity³³.

10. Dioscin: It is steroid saponin isolated from *dioscorea opposita* thunb. It protects liver against non-fatty and fatty lever diseases³⁴.

11. Bupleurum kanoi Liu.: The saikosaponin A is its main chemical constituent. It possesses antifibrotic and hepatoprotective properties³⁵ against rats. The activation of hepatic stellate cells is inhibited by bupleurum Chinese DC³⁶.

12. Picrorhiza kurroa: It is a small herb and grows in Himalayan area. Its main chemical constituents are glycoside picrosides I, II, III and Kutkin³⁷. Flavonoids, triterpenes, alkaloids, apocynin, glycosides, cucurbitacin, drosin and ursolic acid³⁸ are other important active constituents present in this herb. Hepatoprotective properties³⁹ and antiviral activity⁴⁰ are shown by *P. kurroa*.

13. Cichorium intybus L.: It is the herb which grows in Europe, Asia and South Africa. Its active chemical constituents present in its aerial parts are phenolic acids, anthocyanins sterols, flavonoids, hydroxyl cinnamic acid derivatives, sesquiterpenes, coumarins⁴¹ etc. The extract of its root callus shows activity against hepatotoxicity⁴² induced by CCl₄.

14. Osthole: It is a coumarin derivative present in medicinal plants like *Cnidium monnieri* and *Angelica pubescens*. Its chemical name is 7-methoxy-8-(3-methyl-2-butenyl) chromen-2-one. It has been reported as hepatitis suppressor⁴³. It is active against hepatocellular carcinoma⁴⁴.

15. Astragalus: This herb is usually used in China for a long time and it shows therapeutic properties⁴⁵. It is loaded with compounds⁴⁶ calycosin, formononetin, astragaloside and calycosin-7- β -D-glucoside. It protects liver from fibrosis and high fatty liver diseases^{47,48}.

Conclusion

The liver is very important organ of our body and plays significant roles to keep the body healthy. Hence protection of liver from different types of infections and diseases must be seriously taken into consideration. The treatment of liver diseases using herbs and phytochemical with lesser side effects, is preferred by majority of people. In this review some important phytochemicals and herbs have been reported to protect liver from infections and diseases. It is also concluded that some of the herbs may cause toxicity in liver. Further the use of herbs and phytochemical may interact with the drugs which patients are using for other problems. Hence it is advised that medical practitioner must be consulted before the intake of any herbal preparation. A single herbal drug may not be very much effective against all types of liver infections, hence suitable formulations using medicinal plant may be developed. We must follow a healthy life style. The smoking, excessive intake of alcohol must be strictly avoided. Further the excessive intake of fatty foods, starchy food, sugar and salt may be also avoided. The intake of Coffee, Oat nuts, green tea, garlic, grapes and fatty fish rich in womega-3-fatty acid may be advised to protect liver health.

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