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A review on hepatoprotective activity of various medicinal plant

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Abstract

Plants Kingdom play crucial role for the existence of human being on this world. Liver diseases cause by alcohol as it is the major organ associated with the removal of excess ethanol. Increased iron uptake by the hepatocytes, increased production of hydrogen peroxide and free radicals, elevated levels of short-chain fatty acids, all these contribute to the increased per-oxidation of lipids in alcoholic liver. This can lead to liver dysfunction. For the treat liver diseases the use of herbal medicines has increased globally, and this is due to their positive views such as free from serious adverse reactions. Plants derived natural products such as flavonoids, terpenoids and sterols have received considerable attention in recent years due to their diverse pharmacological properties including antioxidant and hepatoprotective activity. The present review had as its objective the collecting of data based on research conducted into some medicinal plants, which have demonstrated hepatoprotective activity.

Keywords: Medicinal plants, phytochemicals, hepatotoxicity, hepatoprotective

Introduction

Medicinal plants play a key function inside the human fitness care. Approximately 80 % of the world populace is predicted on using conventional medicine that predominantly based on plant materials ^[1]. Around 160 phytoconstituents from 101 plants have been proved to possess liver-protecting activity. The World Health Organization (WHO) estimates that between 25 – 40% of pharmaceutical medicines are derived from plants. It is also noted that 40 – 50% of medicines are direct or synthetic copies of plant ingredients. At least 7,000 medical compound in the modern pharmacopoeia are derived from plants. Annual worldwide market for traditional herbal medicine approaches 60 billion US\$. Global estimates indicate that over 3/4th of the 5 billion world population cannot afford the products of Western Pharmaceutical Industry and rely upon the use of traditional medicines derived from plants ^[2].

Hepatoprotective plants contain various chemical contents such as phenols, flavonoids, monoterpenes, lignans, glycosides, carotenoids, coumarins, essential oil, alkaloids, organic acids, lipids, and xanthenes. These plants have capacity to speed up the regeneration of liver cells and heal the liver injuries. Many scientists have tested a large number of plants for their active component having the curative property against drug-induced hepatotoxicity model such as Licorice, Solanum xanthocarpum, and Melothria heterophylla ^[3, 4].

Liver damage and medicinal plants Liver disorders are the most common health hazard found in developing countries due to dietary habits, alcohol ingestion, poor hygiene, unsupervised drug use and smoking etc. Liver diseases can be non-inflammatory, inflammatory and degenerative. High levels of plasma total cholesterol (LDL-C) and triacylglycerols (TGs) are associated with high risk of atherosclerosis and cardiovascular disease owing to the hepatic insufficiency ^[5]. Hepatotoxicity caused by many toxins carbon tetrachloride (CCl₄), thioacetamide, acute or chronic alcohol consumption, various infections like hepatitis A, B, C and drugs, in which drugs are most common offender. Free radical generations in the alcohol use result in development of hepatitis leading to cirrhosis ^[6].

There are several pathways to produce Free radical (FR), the principal source in the body is own metabolism into the cell; however, this is not the only mechanism to induce oxidative stress. The environment plays an important role in the production of FR, reactive oxygen species (ROS) and reactive nitrogen species (RNS), for example, air pollution, UV irradiation, X-rays and gamma-rays.

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The production of ROS can be induced by endogenous or exogenous substances. The most important endogenous sources are cytochrome P450 metabolism, Peroxisomes, microsomes, metal-catalyzed reactions, neutrophils, eosinophils and macrophages during inflammation, and

mitochondria-catalyzed electron transport reactions in the complexes I and III [7].

In the present work, author had reviewed the articles of hepatoprotective activity of the medicinal plants and has arranged them in the systemic order as shown in table 1.

Table 1: Hepatoprotective activity of the medicinal plants

Name of the Plant	Family	Parts Used	Hepatotoxicity inducing agents	Extracts studied	Biochemical and Histopathological Parameters studied
<i>Rauwolfia serpentina</i> [8]	Apocynaceae	Rhizomes	Paracetamol	Ethanol extract	Aspartate amino transferase (AST), alanine amino transferase (ALT), alkaline phosphatase (ALP), Superoxide dismutase (SOD), Catalase (CAT), Glutathione peroxidase (GPX), Glutathione reductase (GRD) and Glutathione S-transferases (GST)
<i>Bambusa arundinaceae</i> [9]	Graminae	Shoots	Thioacetamide	Methanolic extract	Serum Glutamate-Oxaloacetate Transaminase(sGOT), serum glutamic-pyruvic transaminase (sGPT), alkaline phosphatase (ALP), Total and direct bilirubin
<i>Bambusa Vulgaris</i> [10]	Poaceae	Leaves	Carbon tetrachloride (CCL4)	Chloroform extract, ethyl acetate extract and methanol extract	Serum Glutamate-Oxaloacetate Transaminase(sGOT), serum glutamic-pyruvic transaminase (sGPT) and alkaline phosphatase (ALP)
<i>Coriandrum Sativum</i> [11]	Apiaceae	Seeds	Carbon tetrachloride (CCL4)	Ethanol extract	aspartate amino transferase(AST) and alanine amino transferase(ALT)
<i>Wedelia calendulacea</i> [12]	Asteraceae	Leaves	Carbon tetrachloride (CCL4)	Ethanol extract	Aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP) and protein and bilirubin
<i>Andrographis paniculata</i> [13]	Acanthaceae	Aerial part	Paracetamol	Ethanol extract	Glutamate Pyruvate Transaminase (GPT), glutamic oxaloacetic transaminase (GOT), alkaline phosphatase (ALP), bilirubin in peripheral blood serum, superoxide dismutase (SOD), catalase, glutathione (GSH) and glutathione peroxidase (GPx)
<i>Swertia chirayita</i> [13]	Gentianaceae	Aerial part	Paracetamol	Ethanol extract	Glutamate Pyruvate Transaminase (GPT), glutamic oxaloacetic transaminase (GOT), alkaline phosphatase (ALP), bilirubin in peripheral blood serum, superoxide dismutase (SOD), catalase, glutathione (GSH) and glutathione peroxidase (GPx)
<i>Melastoma malabathricum</i> [14]	Melastomataceae	Leaves	Paracetamol and carbon tetrachloride	Methanol	aspartate amino transferase(AST) and alanine amino transferase(ALT)
<i>Solanum xanthocarpum</i> [15]	Solanaceae	Fruits	Carbon tetrachloride (CCL4)	Ethanol extract	Aspartate amino transferase (AST), alanine amino transferase (ALT), Serum alkaline phosphatase (SALP), total bilirubin, lipid peroxidation (LPO), reduced glutathione (GSH), superoxide dismutase (SOD) and catalase (CAT)
<i>Licorice</i> [16]	Fabaceae	Whole plant	Cadmium (CdCl ₂ , Cd)	Water extract	Alanine aminotransferase (ALT), aspartate aminotransferase (AST) and lactate dehydrogenase (LDH)
<i>Cordia obliqua</i> [17]	Boraginaceae	Leaves	Paracetamol	Ethanol extract	Serum glutamate-pyruvate transaminase, serum glutamic oxaloacetic transaminase, alkaline phosphatase, total bilirubin, total protein, albumin and globulin
<i>Dolichousnea longissima</i> [18]	Parmeliaceae	Whole plant	Cisplatin	Articus Extract	Lipid peroxidation (LPO) and (glutathione peroxidase) GSH concentration in liver, superoxide dismutase (SOD) and Catalase (CAT)
<i>Aquilaria agallocha</i> [19]	Thymelaeaceae	Leaves	Paracetamol	Ethanol extract	Serum alanine transaminase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), bilirubin, cholesterol, albumin (ALB) and total Protein (TP) and Serum lactate dehydrogenase (LDH)
<i>Amomum subulatum roxb</i> [20]	Zingiberaceae	Fruits	Ethanol	Methanolic extract	Serum Glutamate-Oxaloacetate Transaminase(sGOT), serum glutamic-pyruvic transaminase (sGPT), alkaline phosphatase (ALP), total bilirubin (TBL), direct bilirubin (DBL), total cholesterol (TC), triglycerides (Tg), thymidine phosphorylase (TP) and fatty change
<i>Pterocarpus Santalinus</i> [21]	Fabaceae	Stem bark	Carbon tetrachloride (CCL4)	Aqueous and ethanol stem bark extract	Serum levels of bilirubin, alanine transaminase, aspartate transaminase, alkaline phosphatase, total protein level, fatty lobules and cellular necrosis
<i>Santalum Album</i>	Santalaceae	Leaves	CC14 and	Hydroalcoholic	Serum Glutamate-Oxaloacetate Transaminase(sGOT),

[22]			paracetamol	Extract	serum glutamic-pyruvic transaminase (sGPT), alkaline phosphatase (ALP), bilirubin, glutathione(GSH),protein synthesis, triglycerides accumulation and lipid peroxidation
<i>Cinnamon</i> [23]	Lauraceae	Bark	CCL4	Ethanollic Extract	Aspartate amino transferase(AST), alanine amino transferase(ALT),alkaline phosphatase(ALP), Superoxide dismutase(SOD), Catalase(CAT), Hepatocyte necrosis and fatty change
<i>Phyllanthus niruri</i> [24]	Euphorbiaceae	Leaves and fruits	Carbon tetrachloride	Methanolic and aqueous	Glutamate oxaloacetate transaminase and Glutamate pyruvate transaminase
<i>Trianthema decandra</i> [25]	Aizoaceae	Leaves	Carbon tetrachloride	Aqueous	Aspartate amino transferase and Alanine amino transferase and Bilirubin
<i>Rosa Damascene</i> [26]	Rosaceae	Flowers	Carbon tetrachloride	Aqueous	Alkaline phosphatase (ALP), Glutamate Pyruvate Transaminase (GPT), glutamic oxaloacetic transaminase (GOT) and lipid peroxide
<i>Pistacia lentiscus</i> [27]	Anacardiaceae	Leaf and fruit	Paracetamol	Ethanollic extract	Aspartate amino transferase(AST), alkaline phosphatase (ALP),Total bilirubin, cholesterol and triglyceride
<i>Crocus sativus</i> [28]	Iridaceae	Whole plant	Acetaminophen	Petals extract	Alanine aminotransferase (ALT), aspartate aminotransferase (AST), bilirubin, total protein and albumin
<i>Wrightia Tinctoria</i> [29]	Apocynaceae	Leaves	Carbon tetrachloride	Hexane, methanol and aqueous extract	Serum Glutamate-Oxaloacetate Transaminase(sGOT), serum glutamic-pyruvic transaminase (sGPT), alkaline phosphatase (ALP) and bilirubin
<i>Piper Longum</i> [30]	Piperaceae	Fruits	Carbon tetrachloride	Ethanollic extract	Serum Glutamate-Oxaloacetate Transaminase(sGOT) and serum glutamic-pyruvic transaminase (sGPT)
<i>Scoparia dulcis</i> [31]	Scrophulariaceae	Whole plant	Carbon tetrachloride	Methanol, diethyl ether and petroleum ether	Aspartate amino transferase, Alanine amino transferase, Alkaline phosphatase and Total bilirubin
<i>Acorus Calamus</i> [32]	Acorus	Rhizomes	Paracetamol	60% alcohol extract	Glutathione peroxidase, Glutathione reductase, Glutathione, Catalase and lipid peroxidation

Conclusion

In conclusion, it is clear that all of above medicinal plants shows significant hepatoprotective activity. This review help the researches to formulation by choosing different plants which could be effective treatment for various liver diseases.

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