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A review on hepatoprotective activity of medicinal plants

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Abstract
Liver is vital organ play a major role in metabolism and excretion of xenobiotics from the body. Liver cell injury caused by various toxic chemicals (certain antibiotic, chemotherapeutic agents, carbon tetrachloride, thioacetamide etc.), excessive alcohol consumption and microbes is well studied. The available synthetic drugs to treat liver disorders in this condition also cause further damage to the liver. Hence, Herbal drugs have become increasingly popular and their use is wide-spread. Herbal medicines have been used in the treatment of liver diseases for a long time so the maintenance of a healthy liver is essential for the overall well-being of an individual. Liver injury induced by toxins is more common nowadays. Herbal remedies are focused in the pharmaceutical industry to evolve a safe route for liver disorders. Therefore, hepatoprotective natural products such as *Boerhaavia diffusa, Baliospermum montanum, Tridax procumbens, Glycyrrhiza glabra, Phyllanthus niruri, Cochlospermum planchoni, Cordia macleodii, Piper chaba, Acacia catechu, Ginkgo biloba, Scoparia dulcis, Vitex trifolia, Trianthema decandra, Tylophora indica, Hoslundia opposite* is reviewed. The present review is aimed at compiling data on promising Phytochemical from medicinal plants that have tested in hepatotoxicity models using modern scientific system.

Keywords: Liver diseases, Hepatoprotection, Hepatotoxicity, Herbal drugs

Introduction
Man's existence on this earth has been made possible only because of the vital role played by plant kingdom. Nature always stands as golden mark to amplify the outstanding phenomenon of symbiosis. Medicinal plants existing even before human being made their appearance on the earth.

Traditional medicines using herbal drugs exist in every part of world. Global estimates indicate that over 3/4th of the 5billion world population cannot afford the products of Western Pharmaceutical Industry and rely upon the use of traditional medicines derived from plants [1].

Every country develops its own medicinal system, which include China, Egypt and India. Thus, the Indian medicinal system came into existence. Raw materials are obtained from plants sources in the form of crude drugs such as dried herbal powders (or) extracts (or) extracts (or) mix of products [2]. Siddha, Unani and Tibetan are traditional health care systems which have been flourishing for many centuries.

These practices incorporated ancient beliefs and were passed on from one generation to another by oral tradition and/or guarded literature. Although herbal medicines are effective in the treatment of various ailments very often these drugs are unscientifically exploited and/or improperly used. Therefore, these plant drugs deserve detailed studies in the light of modern science.

Liver diseases and medicinal plants
Liver has a pivot role in regulation of physiological processes. It is involved in several vital functions such as metabolism, secretion and storage. Furthermore, detoxification of a variety of drugs and xenobiotics occurs in liver. The bile secreted by the liver rats has, among other things, an important role in digestion. Liver diseases are among the most serious ailment. They may be classified as acute or chronic hepatitis (non inflammatory diseases) and cirrhosis (degenerative disorder resulting in fibrosis of the liver). Liver diseases are mainly caused by toxic chemicals (certain antibiotics, chemotherapeutics, peroxidised oil, aflatoxin, carbon-tetrachloride, chlorinated hydrocarbons, etc.), excess consumption of alcohol, infections and autoimmune / disorder.

Most of the hepatotoxic chemicals damage liver cells mainly by inducing lipid peroxidation and other oxidative damages in liver. Enhanced lipid peroxidation produced during the liver microsomal metabolism of ethanol may result in hepatitis and cirrhosis [3]. It has been estimated that about 90% of the acute hepatitis is due to viruses. The major viral agents involved are hepatitis B, A, C, D (delta agents), E and G. Of these, Hepatitis B infection often results in chronic liver diseases and cirrhosis of liver. Primary liver cancer has also shown to be produced by these viruses.

1. It has been estimated that approximately 14-16 million people are infected with this virus in south East Asia region and about 6% of the total population in the region are carriers of this virus. A vaccine has become available for immunization against Hepatitis B virus. Hepatitis C and Hepatitis E infection are also common in countries of South East Asia region [4].
2. In the present work, authors 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 Plant	Source or Family	Plant parts used	Hepatotoxic inducing agents	Extracts studied	Biochemical and Histopathological Parameters studied
Boerhaavia diffusa [5]	Nyctaginaceae	Roots	Thioacetamide	Aqueous	Aspartate amino transferase and Alanine amino transferase
Baliospermum montanum [6]	Euphorbiaceae	Roots	Paracetamol	Alcohol, chloroform extract	Glutamate oxaloacetate transaminase and Glutamate pyruvate transaminase
Tridax procumbens [7]	Asteraceae	Leaves	Carbon tetrachloride	Ethanolic extract	Glutathione, superoxide dismutase and catalase
Glycyrrhiza glabra [8]	Fabaceae	Root powder	Carbon tetrachloride	Root powder mixed with animal feed	Lipid peroxidation
Phyllanthus niruri [9]	Euphorbiaceae	Leaves and fruits	Carbon tetrachloride	Methanolic and aqueous	Glutamate oxaloacetate transaminase and Glutamate pyruvate transaminase
Cochlospermum planchoni [10]	Coclospermaceae	Rhizomes	Carbon tetrachloride	Aqueous	Total bilirubin, Alkaline phosphatase and Alanine aminotransferase
Cordia macleodii [11]	Boraginaceae	Leaves	Carbon tetrachloride	Ethanolic	Glutamate pyruvate transaminase and Serum glutamate oxaloacetate transaminase
Piper longum [12]	Piperaceae	Fruit	Carbon tetrachloride	Milk extract	Serum glutamic oxalactic transaminase, Serum glutamic pyruvate transaminase and Billirubin
Acacia catechu [13]	Leguminosae	Powdered pale catechu	Carbon tetrachloride	Ethyl acetate	Serum glutamic oxalactic transaminase, Serum glutamic pyruvate transaminase, Serum alkaline phosphatase and Bilirubin content
Ginkgo biloba [14]	Ginkgoaceae	Dried extract	Carbon tetrachloride	Ethanolic	Serum glutamic oxalactic transaminase, Serum glutamic pyruvate transaminase, Serum alkaline phosphatase and Bilirubin content
Scoparia dulcis [15]	Scorphulariaceae	Whole plant	Carbon tetrachloride	Methanol, diethyl ether and petroleum ether	Aspartate amino transferase, Alanine amino transferase, Alkaline phosphatase and Total bilirubin
Vitex trifolia [16]	Verbenaceae	Leaves	Carbon tetrachloride	Ethanol and water	Total protein, Histopathological studies, Aspartate amino transferase and Alanine amino transferase
Trianthema decandra [17]	Aizoaceae	Leaves	Carbon tetrachloride	Aqueous	Aspartate amino transferase and Alanine amino transferase and Bilirubin
Tylophora indica [18]	Asclepidaceae	Leaves	Carbon tetrachloride	Methanolic	Serum glutamic oxalactic transaminase, Serum glutamic pyruvate transaminase and Total Bilirubin
Hoslundia opposite [19]	Lamiaceae	Stem	Carbon tetrachloride	Methanol and ethyl acetate	Aspartate amino transferase and Alanine amino transferase and Bilirubin

3. Conclusion

It has been encouraging to witness the recent discoveries in HBV infection with insights into the existence of genotype subgroups, mutant variants, knowledge regarding host, viral and environmental factors on the disease course, as well as advances in new treatment modalities. However, despite the much progress in understanding the natural history of HBV infection, we still have a long way to go before we can conquer hepatitis B infection. For instance, more studies are needed to clarify whether there is an association between genotype, mutant variants and the development of hepatocellular carcinoma. In the HBeAg-positive sub group, there still lacks a consensus on how to manage these patients when they present with signs of mild liver disease activity with alanine amino transferees less than two fold increase; future studies with longer follow-up may help us gain knowledge about the HBV behaviour in these individuals. There is much more to be understood about mutations and their impacts on the clinical course and long-term outcome of hepatitis B infection. For instance, it has been suggested that mutations can arise from vaccine-induced antibodies and this renders the immune response generated by the vaccination ineffective. Therefore, mutations may play a key role in the difficulties of managing hepatitis B infection. Hence, further research and understanding in this sector may bring exciting new information and better understanding of the natural history of HBV and supplement our existing armamentarium to combat this persistent worldwide prevalent disease.

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