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**A REVIEW ON HEPATOPROTECTIVE
ACTIVITY OF
SOME MEDICINAL PLANTS****Jitendra Patel, Venkateshwar Reddy and G.S.Kumar****ABSTRACT**

Liver is a vital organ play a major role in metabolism and excretion of xenobiotics from the body. Liver diseases are a major problem of worldwide proportions and liver damage is very common since liver has the capacity to detoxicate toxic substances. 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 *Solanum americanum* Mill, *Diospyros melanoxylon* (Roxb), *Buchanania lanzan* Spreng, *Cucumis melo* Linn, *Artocarpus hirsutus* Lam, *Terminalia coriacea* (Roxb.) Wight & Arn. are reviewed. In this review article attempt has been made to compile reported hepatoprotective plants from India useful to develop evidence based alternative medicine to cure different kinds of liver disease in man and animals.

KEY WORDS: Hepatoprotection, Hepatotoxicity, Herbal drugs.**INTRODUCTION**

Liver is one of the most important and massive visceral organ present in the substantial portion of abdomen. It is also called 'haper' and made up of hepatocytes which carry out multiple metabolic processes essential for life. It is also involved in the removal of toxic materials from blood to avoid life threatening toxicities. Liver diseases have become one of the major causes of

morbidity and mortality all over world. Many drugs and chemicals cause different types of hepatotoxicity that are highly variable, ranging from asymptomatic elevation of liver enzymes to fulminant hepatic failure. Throughout the world, the researchers have been in continuous search for some effective therapy for restoring the liver functions. The plant kingdom is undoubtedly one of the precious sources of new medicinal agents. Many plants and herbs play a major role in the management of various liver disorders. Different plant species in India like *Solanum americanum* Mill, *Diospyros melanoxylon* (Roxb), *Buchanania lanzan* Spreng, *Cucumis melo* Linn, *Artocarpus hirsutus* Lam, *Terminalia coriacea* (Roxb.) Wight & Arn have been found to be hepatoprotective. Plant derived natural products such as terpenoids, alkaloids, flavonoids and steroids have gained significant considerations in recent years due to their various pharmacological properties including antioxidant and hepato protective activity^[1].

***Solanum americanum* Mill**

Solanum americanum Mill belongs to the family Solanaceae commonly known as American black nightshade. Several studies has been conducted to evaluate the hepatoprotective activity of aqueous extract as well as whole plant of *Solanum americanum* against ally alcohol induced liver damage in rats. This was confirmed in our study also which shows that, the aqueous extract was effective in protecting the liver against the injury induced by ally alcohol in rats which was evident from biochemical investigation of serum glutamate oxaloacetate transeaminase, serum glutamic Pyruvate transeaminase, Alkaline phosphatase and Total Bilirubin^[2,3].

***Diospyros melanoxylon* (Roxb)**

Diospyros melanoxylon (Roxb) belongs to the Family Ebenaceae. It is the coromandel ebony or east Indian ebony, is a species of flowering tree that is native to India and Sri Lanka and that has a hard, dry bark. Its common name derives from Coromandel, the coast of southeastern India. The leaf contains flavones, pentacyclic triterpenes found to possess antimicrobial properties, while the bark shows antihyperglycemic activity. The bark of four *Diospyros* species found in India has been determined to have significant antiplasmodial effects against *Plasmodium falciparum*, which causes malaria in humans.

The hepatoprotective activity of ethanolic extract of leaves of *Diospyros melanoxylon* (Roxb) against CCl₄ induced liver damage in rats was evaluated in various studies. In some earlier studies the ethanolic extract of *Diospyros melanoxylon* was administered orally to the animals with hepatotoxicity induced by CCl₄ and the protective effect was confirmed against the injury induced by CCl₄ in rats and supported by biochemical investigation of serum glutamate oxaloacetate transeaminase, serum glutamic Pyruvate transeaminase, Alkaline phosphatase and Total Bilirubin [4]. Reports from earlier studies supports that ethanolic extract of leaves of *Diospyros melanoxylon* restored the normal lobular architecture with mild centrilobular degeneration of hepatocytes which was evidenced by histopathological studies and also significant changes in biochemical parameters were also reported^[5,7].

***Buchanania lanzan* Spreng**

Buchanania lanzan Spreng belongs to the Family Anacardiaceae. These almond-flavoured seeds are used in cooking as spice especially in India. *Buchanania lanzan* is cultivated across India, primarily in the northwest. The hepatoprotective activity of

methanolic and aqueous extract of bark of *Buchanania lanzan* against paracetamol induced liver damage in rats were well documented in several earlier studies [8-11].

***Cucumis melo* Linn**

It is a type of herbaceous plant, often rampant in dry sandy areas of savanna land, and occurring throughout the tropics and sub-tropics and also in West African region. *Cucumis melo* Linn belongs to the Family Cucurbitaceae. The fruits of *cucumis melo* linn (CM) was reported for the hepatoprotective activity against albino rats with liver damage against rifampicin-isoniazid at the dose ranges from 100 - 500 mg/kg bw with normalized biochemical parameters like Serum alanine aminotransferase (ALT), Serum aspartate aminotransferase (AST), Serum alkaline phosphatase (ALP), Serum total bilirubin (BILT), and Serum total proteins (TP), Lipid peroxidase (LPO), glutathione peroxidase (GPx), glutathione reductase (GRD), superoxide dismutase (SOD), catalase (CAT) and reduced glutathione (GSH) [12,14].

***Artocarpus hirsutus* Lam**

Artocarpus hirsutus Lam is a tropical evergreen tree species that is native to India belongs to the Family Moraceae. The ripe fruit is eaten after removing the spiny outer skin. The structure of the fruit is similar to that of jackfruit. The seeds are also edible, usually fried as snacks. Hepatoprotective activity of methanol extract of the leaves of *Artocarpus hirsutus* was reported with presence of glycosides, flavonoids, Tannins, triterpenoids, carbohydrates and steroids through phyto chemical methods [18].

***Terminalia coriacea* (Roxb.) Wight & Arn**

Terminalia coriacea Roxb. Wight & Arn. is widely distributed in drier and warmer parts of southern areas like Andhra Pradesh and Tamil Nadu and in central India. It belongs to family Combretaceae. The bark of the plant is traditionally used as cardiac stimulant, in treatment of atonic diarrhoea and callous ulcer. Literature shows that this species is rich in tannins and phenolic content and exhibits high level of anti-oxidant activity [19].

Table 1 Review of Plants Used In the Treatment of Liver Disease:

Plant	Family	Type of Extract	Part used	Model used	Remarks
<i>Solanum americanum</i> Mill	Solanaceae	Aqueous	Whole Plant	Allyl alcohol induced in rats.	Reduce SGOT, SGPT, ALP and TB.
<i>Diospyros melanoxylon</i> (Roxb)	Ebenaceae	Ethanol	Leaves and fruits	CCl4 induced in rats.	Reduce SGOT, SGPT, ALP and TB.
<i>Buchanania lanzan</i> Spreng	Anacardiaceae	Aqueous and alcohol	Bark	Paracetamol induced in rats.	ALT, AST, ALP, BILD, BILT, CHO and TG levels reduced and ALB and PRO levels increased
<i>Cucumis melo</i> Linn	Cucurbitaceae	Methanol	Fruits	Rifampicin-isoniazid	Decreased the level of ALT, AST, ALP,

				induced in rats.	BILT, TP, ALB and GLO, LPO and increased the levels of GPx, GRD, SOD, CAT, GSH
<i>Artocarpus hirsutus</i> Lam	Moraceae	Methanol	Leaves and fruits	CCl4 induced in rats.	Decreased the level of ALT, AST, ALP, Total bilirubin, direct bilirubin and cholesterol
<i>Terminalia coriacea</i> (Roxb.) Wight & Arn	Combretaceae	Methanol	Leaves and fruits	CCl4 induced in rats.	Decreased the level of ALT, AST, ALP, Total bilirubin, direct bilirubin and cholesterol

CONCLUSION:

Considering the enormous biodiversity resources of Indian traditional system and high Incidence of liver complications, the present review focused on certain collection of data of few plants, which are commonly available in India and these medicinal plants were claimed as liver protective agents which deserves further experimental supports and evidences.

Conflict of interest statement

We declare that we have no conflict of interest.

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