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## Hepatoprotective action of vegetables

**Divyashree. J**

Research Scholar, Maharishi University of Information Technology, Lucknow  
Corresponding author email: [divyaram.nr@gmail.com](mailto:divyaram.nr@gmail.com)

**Dr. Sapna Tomar**

Associate professor, RBS Engineering Technical Campus, Agra  
Email: [sapnatomar\\_rbs@rediffmail.com](mailto:sapnatomar_rbs@rediffmail.com)

**Dr. Akhand Pratap Singh**

Professor, Maharishi University of Information Technology, Lucknow  
Email: [akhand73@rediffmail.com](mailto:akhand73@rediffmail.com)

**Abstract**--India is a culturally diverse and traditional country. This region has its own set of dietary customs and medicinal practises. In India, a variety of traditional medical methods, including folk medicine, tribal medicine, Ayurveda, Siddha, and Unani, rely on herbal resources for therapeutic purposes. However, it has been discovered that most of the plants and their components, such as leaves, seeds, fruits and medicinal rooted substances contains antioxidants, flavonoids, tannins, and other phenolic compounds. Around 7,500 plants are said to be employed in the tradition of local health in rural and tribal regions in India. The true therapeutic efficacy of over 4,000 plants is either unknown or unknown to the general public. Around 1,200 plants are used in ancient medical systems like as Ayurveda, Siddha, Amchi, Unani, and Tibet. The liver plays an significant role in performance, maintenance and control of homeostasis in the body. It comprises a range of metabolic growth pathways, disease control, nutrition storage and supply. Additionally, it functions as a metabolic centre for the metabolism of nutrients such as proteins, lipids and carbohydrates, as well as the excretion of metabolic waste. Bile, which is secreted by the liver, plays a crucial function in digestion. Maintaining a healthy liver is consequently critical for an individual's general well-being. Liver injury is because of many hazardous compounds introduced via food must be detoxified. The majority of hepatotoxic substances cause harm to liver cells by the production of reactive species. Free radicals created by excessive exposure to hepatotoxic substances can occasionally overwhelm the liver, resulting in jaundice, cirrhosis, and fatty liver. It has been proved that the production of reactive species causes significant liver damage to necrosis of the tissue and plasma membrane damage,

among other effects. India is blessed with a varied range of climatic conditions that favour the cultivation and consumption of region-specific vegetables. As a result it was established that CCl<sub>4</sub> induced hepatotoxicity was detected with methanolic extracts of vegetables.

**Keywords**---hepatoprotective, CCl<sub>4</sub>, paracetamol, hepatotoxicity, antioxidants.

## **Introduction**

A variety of food-significant plants are employed as preventive substances for various diseases in Indian traditional medicine. Many vegetables are consumed without being aware of their medicinal properties. The health advantages are mostly attributed to phytochemicals like polyphenols, carotenoids, vitamin-E and C. Hepatotoxicity is one of the biggest issues in pharmacovigilance today, and it's the main reason people stop taking a drug because they think it's not safe. Researchers frequently employ in vivo and vitro models to conduct their investigations. Chemical toxins can induce liver damage (including acetaminophen, carbon tetrachloride, galactosamine, and thioacetamide). A lot of hepatotoxic chemicals make lipid peroxidation more likely in the liver cells. The liver cirrhosis model that has been studied the liver cirrhosis caused by CCl<sub>4</sub>. CCl<sub>4</sub> was the first toxin in which a free-radical mechanism was demonstrated to have a significant role in the damage produced. The cytochrome P450 enzyme breaks down CCl<sub>4</sub> into the radical, carbon-centered trichloromethyl. ROS can damage cells and cause diseases like liver cirrhosis and fibrosis in humans. Reactive aldehydes, malondialdehyde (MDA), and 4-hydroxynonenal are some of the products that fatty acids break down into. These products are very easy to attach to protein working groups and stop a lot of enzyme activity. As a result of all of these changes, body cells die and TBARS and lactate dehydrogenase (LDH) leak out of them. The second phase of hepatotoxicity caused by CCl<sub>4</sub> is when Kupffer cells get activated and make mediators. Hepatoprotection can be seen in extracts with a lot of free radical breakers and antioxidants. Additionally, they convert free radicals to waste products that are excreted and they have the capacity to repair cells that have been injured.

## **Beta vulgaris**

Flavonoids, glucose, betaine, neobetain, and anthocyanin colours have all been identified in beet root phytochemical studies. Ranju Pal et al. [3] evaluated the impact Determination of hepatoprotective impact of EEBV was measured by serum enzyme levels of alkaline phosphatase (ALP), total protein, alanine aminotransferase (ALT), bilirubin, and aspartate aminotransferase (AST). The extract was shown to reduce CCl<sub>4</sub>-induced increased blood levels of enzyme activity and bilirubin, with a related fundamental increase in total protein, AST, ALT, and ALP, suggesting that the extract may assist the liver retain its normal functional state. The existence of normal hepatic cords in liver sections from animals treated with the EEBV extracts, as well as the absence of necrosis and fatty infiltration, provided additional evidence for the extracts' hepatoprotective

effect. Hepatoprotective action of EEBV is due to chemical components present in its leaves [4-5].

### **Brassica oleracea**

Ahmed et al. investigated hepatoprotective activity of ethanolic extract of cabbage vegetable against the simvastatin drug-induced hepatotoxicity [6]. Rats treated with *Brassica oleracea* extract (300 mg/kg p.o. and 500 mg/kg p.o.) had their simvastatin-induced increased serum enzyme levels reverted to normal. It is possible that BO extracts may also protect the liver from oxidative stress due to the presence of alkaloids and other compounds like as polysaccharides, phenolics, glycosides, phenolic acids, saponins, steroids, tannins, and terpenoids.

### **Colocasia antiquorum**

Tuse et al. [7] examined the hepatoprotective efficacy of an ethanolic extract extracted from *colocasia antiquorum* using paracetamol and CCl<sub>4</sub>-intoxicated rats. Serum biochemical markers and histological examination confirmed the protective effect. In comparison to silymarin, ethanolic extract of CA considerably ( $P < 0.5$ ) inhibited the rise of SGOT & SGPT (Control). These biochemical data was validated in liver sections by histopathology analysis, which disclosed that prevention of disorganisation and degradation of hepatic cells induced by paracetamol and CCl<sub>4</sub>. It is possible that the action is due to the presence of anthocyanin molecules in *colocasia antiquorum*. Moreover, acute hepatotoxicity empirical evidence supporting no hepatotoxicity up to a dosage of 1000 mg/kg. As a result, it may be stated that *Colocasia antiquorum* ethanolic extract contains considerable hepatoprotective qualities.

### **Coriandrum sativum (Coriander)**

Leena Kansal et al. and Aga [8-9] investigated their ability for liver protection against Lead nitrate-induced oxidative stress and tissue destruction. After Lead nitrate overdose, several biochemical liver indicators such as ALP, AST, total cholesterol, ACP, and ALT exhibited substantial elevations. However, the usage of aqueous cilantro extract and ethanol extract resulted in a substantial decrease ( $p < 0.001$ ) in liver AST, ALT, total cholesterol ALP & ACP levels. over production of reactive oxygen species (ROS) and decrease in antioxidant levels of cells was observed in Lead treatment. Antioxidizer properties like linalol and glycosides like different  $\beta$ -Dglucopyranosides are found in active components in coriander. This may be why hepatoprotection takes place [10-11].

### **Daucus carota sativus (carrot)**

Bishayee et al. made a study using carrot extraction on effects of acute liver injury caused by carbon tetrachloride (CCl<sub>4</sub>). Pretreatment with the carrot extract significantly reduced CCl<sub>4</sub> induction, while increasing serum enzyme levels (e.g. sorbitol, glutamate dehydrogenase, lactate dehydrogenase, glutamate oxaloacetate transaminase, glutamate pyruvate transaminase and alkaline phosphatase). Additionally, the extract lowered the high concentration of CCl<sub>4</sub> administered for serum bilirubin and urea. The extract dose-dependently inhibited hepatic 5'-

nucleotidase, acid ribonuclease, and acid phosphatase activity, while increasing succinic dehydrogenase, cytochromium P-450, and glucose 6-phosphatase levels. The results of this study indicated that carrots may offer considerable protection against CCl<sub>4</sub>-induced hepatocellular damage. Mani Vasudevan et al. [12] and Shoba et al. [13] discovered the similar hepatoprotective properties in *Daucus carota* seed extracts against paracetamol, isoniazid, and alcohol-induced hepatotoxicity. According to Balasubramaniam et al. [14], carrots have a hepatoprotective effect against lindane.

### ***Luffa acutangula***

Using a hydro-alcoholic extract of *Luffa acutangula*, Jadhav et al. [15] investigated the hepatoprotective efficacy of Ridge Guard against CCl<sub>4</sub> and the hepatotoxicity of Rifampin. Silymarine and HAELA treatment provided considerable protection against CCl<sub>4</sub> and rifampicin-induced hepatotoxicity in rats. This might be attributable to decreased serum marker enzyme levels (ALT, AST, LDH, and ALP) and higher total protein in the analyzed groups than the control group, also enhanced histoarchitecture of the treated groups' hepatic cells. Increased levels of nonenzymatic intracellular antioxidants such as glutathione and enzyme antioxidants such as catalase and superoxide dismutases also result in considerable reductions in malondialdehyde production (MDA). The results of this investigation indicated that HAELA's hepatoprotective action is a result of endogenous antioxidants and membrane lipid peroxidation inhibition [16-20]. Rawat et al. investigated hepatoprotective potential of ethyl acetate extracts of *Allium cepa* bulbs, *Swertia chirata* twigs, *Silky acutangula* leaves, and *Woodfordia floribunda* leaves in comparison to Silymarin. *Luffa cylindrica* Linn alcoholic and aqueous fruit extracts have hepatoprotective activity in mice [21].

### ***Moringa oleifera***

Balamurugan et al. [22] investigated the methanolic extract of *Moringa* leaves and its hepatoprotective effect against CCl<sub>4</sub>-induced liver damage. Rukmani et al. [23] described hepatotoxicity caused by paracetamol. The leaves of *Moringa* were found to have significant hepatoprotective action, lowering the levels of Total Bilirubin, Direct Bilirubin, SGPT, and SGOT in CCl<sub>4</sub>-treated mice. The hepatoprotective properties of the majority of plant materials have been related to their flavonoid content. *Moringa* leaf extracts are potent antioxidants that inhibit free radical oxidation, protect key macromolecules from oxidation, and provide considerable oxidation protection [24-26]. Ezeonwu et al. [27] demonstrated hepatoprotective efficacy of the biphenolic extracts of *Phyllanthus Niruri* and *Moringa Oleifera* in Albino Rats against CCl<sub>4</sub>-induced liver damage.

### **Conclusion**

This paper describes that Consumption of vegetables has been demonstrated to reduce the chance of developing a variety of ailments. All the vegetable extracts have effective hepatoprotective activity against CCl<sub>4</sub> induced hepatotoxicity in vitro conditions. Also, describes about the possible mechanism may be due to the

presence of flavonoids and phenolics compound which is responsible for hepatoprotective activity.

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