RESEARCH ARTICLE

Pharmacological Investigations of *Corchorus trilocularis* and *Cressa cretica* Medicinal Plant for Hepatoprotective Activity

Purnendra Kumar Gupta*, Vivek Chourasia

Faculty of Pharmacy, Mansarovar Global University, Sehore Madhya Pradesh, India

Received: 12th Apr, 2025; Revised: 19th May, 2025; Accepted: 2nd Jun, 2025; Available Online: 25th Jun, 2025

ABSTRACT

In albino rats that had been exposed to carbon tetrachloride-induced hepatotoxicity, the antioxidantand hepatoprotective properties of the ethanolic extract of *Corchorus trilocularis* and *Cressa Cretica* leaves were investigated. Biochemical markers such total protein (TP), total albumin (TA), serum glutamate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), alkaline phosphate enzyme (ALKP), whole blood levels, and bilirubin were estimated in order to determine the level of resistance. In vitro and in vivo lipid peroxidation generated by CCl4 was also inhibited by the extract. Rats exposed to hazardous dosages of ethanol extract in carbon tetrachloride (200 and 400 mg/kg body weight) had notable hepatoprotective effects. The extract's hepatoprotective properties were evaluated against a conventional dose of silymarin (10 mg/kg body weight IP).

Keywords: *Corchorus trilocularis* and *Cressa Cretica*, Hepatoprotective Activity, Silymarin, Carbon tetra chloride.

How to cite this article: Purnendra Kumar Gupta, Vivek Chourasia. Pharmacological Investigations of *Corchorus trilocularis* and *Cressa cretica* Medicinal Plant for Hepatoprotective Activity. International Journal of Drug Delivery Technology. 2025;15(2):705-08. doi: 10.25258/ijddt.15.2.43

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

The heaviest organ in the human body is the liver. An adult typically weighs 1.1 kg. The liver is made up of hepatocytes arranged in uneven, branching, linked plates around a central artery. It is separated into right and left lobes. The sinusoids, which get blood from the heart, are another component of the heart. Stellate reticuloendothelial cells (Kupfer), stable phagocytes that break down bacteria, red blood cells, white blood cells, and other foreign materials eroded from the venous blood in the colon, create the sinusoids. Bile is a byproduct of the digestive system and liver cells' excretory products. Bile acid salts, specifically sodium and potassium salts, are crucial for the emulsification and breakdown of big lipid globules, which allows for fluid [1].

The liver is responsible for the difficult task of regulating metabolism and homeostasis in the human body. This involves the elimination of endogenous waste products and xenobiotics from bile as well as the production of vitamins, lipids, amino acids, and carbohydrates in bile [2].

Given the heavy dependence of other organs on the functioning of the liver, liver disease has a significant impact. Cardiac damage and symptoms often follow a characteristic pattern. In some cases, pathological processes occur primarily in the liver. In other cases, the effect on the liver is often secondary to a few of the most prevalent illnesses in people, including extrahepatic disorders, alcoholism, and heart problems, and to infectious diseases or sexual intercourse or bile ducts.

Liver Anatomy

The largest organ in the body, the liver is situated beneath the diaphragm in the lower right ribcage. The visceral peritoneum and an uneven layer of tissue located deep within the peritoneum cover it almost completely. The falciform ligament divides the liver into two main lobes: a tiny left lobe and a large right lobe. Many veterinary professionals believe that the lower and posterior lobes are also part of the right lobe [3].

Structure

There are several lobules, or lobules, that make up the liver lobes. The lobules are made up of specialized cells known as hepatocytes, or hepatocytes, which are grouped around a central artery in uneven, branching, interconnecting plates. Blood flows through bigger endothelial cells termed sinusoids in the liver as opposed to capillaries. The stellate reticulo endothelial cells (Kufferâs), which phagocytose worms, germs, and poisons, also include the sinusoids. The bile that is released by the liver cells travels through tiny ducts and bile capillaries. Eventually, the ducts unite to produce therightand left hepatic ducts, which combine to form the hepatic duct that leaves the liver. To form the hepatic duct, these hepatic channels additionally connect to the gallbladder's cystic duct. A tube allows the pancreatic and hepatic ducts to enter the duodenum.

Blood Supply

Blood is supplied to the liver from two sources: While oxygenated blood is given by the hepatic artery, deoxygenated blood is supplied by the hepatic portal vein, which also carries fresh nutrients. Through the thoracic branches and upper blood arteries, blood is sent to the sinusoids liver, where the liver cells absorb oxygen, the

**Author for Correspondence: purnendragupta32@gmail.com*

Table 1: Effect of ethanolic extract from *Corchorus trilocularis* and *Cressa cretica* on blood biochemical characteristics (SGOT, SGPT, ACP, ALP, and creatinine) through CCl4-mediated hepatotoxicity

Treatment	SGOT Activity in IU/L	SGPT Activity in IU/L	ACP KA units	ALP KA units	Creatinine mg/dl
Normal control	133.3 ±19.230	56.67 ±18.559	1.71 ±0.3180	4.50 ±0.5203	0.4 ±0.000
CCl4 (0.125ml, i.p.)	436.3 ±29.695 ####	328.57 ±29.157 ###	8.66 ±0.9391 ####	12.93 ±0.3933 ####	2.7 ± 0.7055 ##
Standard (Silymarin 100 mg/kg)	182.3 ±14.111****	71.00 ± 1.547***	2.84 ±0.0833****	5.487 ±0.1967****	0.8 ±0.2309**
Corchorus trilocularis 200 mg/kg	298.7 ±29.695*	270.00 ±61.101 ns	4.83 ±1.014**	8.427 ±0.5203**	1.6 ±0.4000 ns
Corchorus trilocularis 400 mg/kg	208.00 ±16.000***	143.33 ±29.627**	4.08 ±0.2205***	7.250 ±0.3378***	1.07 ±0.1333*
Cressa cretica 200 mg/kg	293.3*	210.00 ±28.868 ns	4.33 ±0.6667**	9.017 ± 0.5203**	1.47 ±1.333 ns
Cressa cretica 400 mg/kg	234.7***	103.33 ±26.034**	4.00 ±0.2887***	6.467 ±0.6813****	1.2 ±0.2309*

Displayed as mean ± S.E.M. are the values (n = 06). If we compare this group to the paracetamol group, we find that * p ± 0.05, ** p ± 0.01 and *** p ± 0.001 are considered statistically significant, whereas #p ± 0.05, ##p ± 0.05 and ###p ± 0.001 are considered significant values. Not significant, with a p-value less than 0.05, is indicated by a ns value.

majority of nutrients, and certain toxins. In the blood sinusoids, reticulo endothelial cells (Kufferâs) phagocytose foreign materials and germs. The liver frequently has branches of the bile ducts, hepatic portal vein and hepatic artery. These patterns are collectively called as the portal tradition [4].

Corchorus trilocularis Linn

There are between 40 to 100 species of flowering plants in the genus Leaves (Tiliaceae), which are native tothe worldof subtropical and tropical regions. The most significant crop after cotton is the leaves crop, which is a member of the genus Leaves. Though it originated in Africa and Asia, leaves have now migrated to Europe, Australia, and South America. It is widely cultivated in India, Bangladesh, China, Myanmar and Nepal [5].

"Tridosha" refers to the sour and delicious leaves that have several medicinal uses, including as a cooling stimulant, tonic, laxative, destroyer, and aphrodisiac. Some people have found that eating the leaves of some species of Corchorus helps with mineral shortages since they contain trace amounts of these minerals. You can utilize the seeds to alleviate aches and pains, gastrointestinal issues, skin conditions, scabies, and tumors. There have been reports that the leaves can help avoid heart problems [6].

Cressa Cretica

Cressa Cretica (Linn), belongs to the family Convolvulaceae [7], and is an erect, small, dwarf shrub that often grows in association with the subspecies *Suaeda, Salicornia, Salsola and Limonium* [8]. Wonderful salt plants like *Cressa Cretica* are found near beaches. In traditional Indian medicine, C. cretica is referred to as Rudanti and is regarded as an Ayurvedic remedy. It is said to possess expectorant, antiseptic and antibacterial qualities. The plant is used as a tonic, in the treatment of constipation, leprosy, asthma, and urination, as well as an anthelmintic, stomachic, tonic, and aphrodisiac. In Bahrain, the herb has long been utilized as an expectorant and anti-bile agent [9].

Cressa Cretica acts as an expectorant, stomachic, antiseptic and other medicine. Asthma, bronchitis, indigestion, flatulence, colic, anorexia, diabetes, leprosy, tonic, aphrodisiac, and impotence have all been traditionally treated with this plant. It is reported to have antibacterial, anthelmintic, blood-thinning, constipating, diuretic and other effects. The plant is also used as a bitter, pungent, hot medicine and in the treatment of skin diseases [10].

MATERIALS AND METHODS

The plant material of fresh leaves of *Chorchorus Tricularis* and *Cressa Cretica* was locally collected from Bhopal and verified by the Department of Botany, Safia College, Bhopal. and provided an herbarium specimen no. for future reference.

Preparation of the Extract of Leaves

The extract is prepared according to the maceration method. Briefly, *leaves* and vitex leaves are collected, dried in the shade for five days and turned into powder. In a closed tank, approximately 0.95 kg of powder was extracted using 99% pure ethanol at a 1:2 (w/v) ratio. After that, the extract was weighed, sealed, and dried in a water bath. Determine the yield percentage. The yield is 17.16% and the dry crude extract weighs roughly 0.16 g [11].

Preliminary Phytochemical Screening

Standardized analysis was performed for various botanical properties of the extract. Crude extracts were analyzed for the presence of other metabolites using standard methods[12] and flavonoids.

Preliminary extract of hydro alcoholic phytochemical screening of *Cressa Cretica leaves Corchorus trilocularis and* have demonstrated the presence of steroids, alkaloids, tannins, flavonoids, and saponins.

Determination of Total Phenolic Contents (TPC)

The total phenolic content of the peel extract of Musa balbisiana was determined using the Folin-Ciocalteu method with all three solvents. To summarize, 2.5 mL of 10% (w/v) Folin-Ciocalteu reagent was mixed with 1 mL of 100-500 µg/mL solution sequentially. Following five minutes, 2.0 mL of 75 percent Na2CO3 was added to the mixture, and it was incubated at 50 °C for ten minutes with stirring every so often. After swapping out the extract-free sample for the original, we let it cool and then used a UV Spectrophotometer (Shimazu, UV-1800) to detect absorbance at 765 nm. Source: Lee et al. (2015). The dry extract's gallic acid equivalents in milligrams per gram (mg GAE/g) have been reported.

Determination of Flavonoid Contents

The flavonoid content of each of the three solvent-extracted Musa balbisiana peel extracts was measured separately. In a mixture that included 5.6 mL of distilled water, 0.2 mL of a 10% (w/v) AlCl3 solution in methanol, and 0.2 mL of potassium acetate (1 M), a 1 mL portion of the extract solution (25-220 µg/mL) was added. A blank was used to compare the measured absorbance at 415 nm after 30 minutes of incubation at room temperature. The findings were displayed as milligrams/gram of dried extract's quercetin equivalents (mg QE/g) (Aryal et al., 2019).

Animal Study

Healthy Wister rats, male or female, weighing approximately 150 to 200 g used in the work was acquired by Raghavendra Enterprises; the animals were housed in separate enclosures in a 12-hour light-dark cycleair-conditioned room with, 22 ± 20 ºC temperature, and 50% ± 10% relative humidity. Animals were housed in the lab for the duration of the investigation. The animals were given unlimited access to purified water and a normal rat pelleted food (Pranav Agroâs Ltd, India). Permit the animals entry to the lab seven days before the study begins. The Indian Animal Care and Management Committee (IAEC) gave its stamp of approval to the experiment design, and the researchers followed their guidelines to the letter.

Drugs and Dosing Schedule

Albino wistar rats of any sex between 155-200 g have been split into seven sets, having 6 animals in every set.Group 1 was negative control group and received vehicle only. Group 2-5 were given CCl4 (0.125ml) with liquid paraffin (1:1) intraperitoneally per 100 g b.w. Group 2 served as positive control and underwent CCl4 treatment. Group 3 had been given std Silymarin (100mg/kg) for 5 days. Group 4-5 animals were given successive EECT as well as EECC extracts for 5 days Table 5.1. On last day, excepting control group, all other groups received CCl4 (IP, CCl4 (0.125ml) with liquid paraffin (1:1) per 100g b.w., 30 minutes following corresponding extract therapy, standard silymarin as well as vehicle. EECT as well as EECC extracts and standard silymarin were administered orally for 5 days.

Serum Analysis

Separate the liver and store in a cool place. After that, they were swiftly covered with filter paper, cooled in 0.25 M sucrose, and sliced thinly using a surgical blade. Tissues were homogenized and minced incold-ice 10 mM tris HCL buffer (pH 7.4) at a conc. of 10% w/v with a 25-piece glass homogenizer with a firm Teflon pestle at 2500 rpm. Prolonged homogenization under conditions of low osmotic pressure aims to disrupt the ventricular structure of the brain as much as possible, thereby releasing soluble proteins and leaving membrane and extravascular material sedimented. It is then centrifuged in a cold centrifuge at 20 min for 5000 rpm, and the temperature is controlled at ± 40 ° C during the centrifugation process. The supernatants were well separated and used to estimate tissue antioxidant and prooxidative activity [15].

CCl4 Induced Hepatotoxicity in Animal Treatment

There were five groups of six mice each among the mice. The timing of the carbon tetrachloride dose and test samples for CCl4 poisoning are displayed in Table 1. Groups 1 and 2 were administered 2% acacia for 7 days, group 3 was administered silymarin, group 4 was administered three rounds of aqueous sage extract, group 5 was administered three rounds of ethanolic sage extract and group 6 was treated with aqueous extract of *Cressa Cretica* and group 6 was treated with ethanol extract. On the seventh day, 30 min after administration, groups 2, 3, 4, 5, 6 and 7 received 1.5 ml/kg CCl4 in olive oil (1:1). Three hours after acute CCl4 treatment, the animals were killed. From the carotid artery, blood was drawn. Biochemical characteristics We measured aspartate and alanine aminotransferase enzymes using the Span diagnostic kit.

Statistical Analysis

We do not express the biochemistry results as mean ± SEM. For statistical significance, we utilized the Dunnet t test in conjunction with one-way ANOVA. The significance level was set at $P < 0.05$.

RESULTS AND DISCUSSION

The primary organ involved in the creation, absorption, and breakdown of proteins and enzymes is the liver. As a result, the quantity and/or activity of biological substances can have an impact on liver function. Numerous chronic diseases are becoming more closely linked to the immune system, and allopathic medicine offers few options for treating or even preventing these conditions. Because CCl4 is bio transformed into the trichloro methyl free radical (CCl3) in the endoplasmic reticulum, by the cytochrome P450 system it is known to increase metabolism and cause hepatotoxicity. In the presence of oxygen, trichloromethyl free radicals react with proteins and lipids in cells to create trichloromethyl peroxyl radicals, which have a higher rate of lipid destruction in the endoplasmic reticulum membrane than trichloromethyl free radicals consequently.

CONCLUSION

According to this study, using ccl4 could raise the levels of the blood enzymes SGPT and SGOTand the ethanol extract of *Corchorus trilocularis* leaves and *Cressa Cretica* and silymarin treatment group showed lower SGPT and SGOT in the ccl4 treatment group. The stabilization of blood SGPT and SGOT levels in three classes of *Leaves* and *Cressa Cretica* is an indication of the improvement in the functionality of hepatocytes. Biochemical analysis clearly showed that the hepatocytes in the control group receiving

carbon tetrachloride, ethanol extract of *Corchorus trilocularis* leaves and *Cressa Cretica* treatment group (200 and 400 mg/kg p.o.) were normal. Therefore, the ethanolic extract of *Corchorus trilocularis* leaves and *Cressa Cretica* can be considered as a strong hepatoprotective agent because it restores the liver function that was harmed by CCl4. Therefore, the ethanolic extracts of *Corchorus trilocularis* leaves and *Cressa Cretica* appear to have hepatoprotective activity.

REFERENCES

1. Meyer SA, Kulkarni AP. Hepatotoxicity. In: Hodgson E, Smart RC, editors. *Introduction to Biochemical Toxicology.* 3rd ed. New York: John Wiley and sons; 2001. pp. 487–490.
2. Guntupalli M, Chandana V, Pushpangadan P, Shirwaiker AI. Hepatoprotective effects of rubiadin, a major constituent of Rubiacordifolia Linn. *J. Ethnopharmacol.* 2006; 103:484–490.
3. A Sharma, B Sangameswaran, V Jain, M S Saluja Hepatoprotective activity ofAdina cordifolia against ethanol induce hepatotoxicity in rats. *International Current Pharmaceutical Journal* .2012; 1(9): 279-284.
4. Akram Eidi1, Pejman Mortazavi, Maryam Bazargan1, Jalal Zaringhalam. Hepatoprotective activity of cinnamon ethanolic extract against CCL_4-induced liver injury in rats. *Excli Journal* .2012; 11:495-507.
5. Kim C., Sin M., Ahn D., Lee K. 1999. Chinese Materia Medica Grand Dictionary 1st ed., Jeongdam Publishing Company, Chopra K., Seoul. Kaur, G., Tirkey N., 2006. Beneficial effect of hesperidin on lipo polysaccharide-induced hepatotoxicity. Toxicology 226,152–160.
6. Zakaria Z. A., Abdul Ghani Z. D., Raden Mohd Nor R. N., Gopalan H. K., Sulaiman M. R., Mat Jais A. M., Abdullah F. C.2007. Antinociceptive and anti-inflammatory properties of *Corchorus capsularis* leaves chloroform extract in experimental animal models. *Yakugaku Zasshi* 127: 359–365. doi: 10.1248/yakushi.127.359
7. H. O Saxena and M. Brahman, The Flora of Orissa, Capital Business Services and Consultancy, Bhubaneswar, India(1995)
8. N. D. Prajapati, S. S. Purohit, A. K. Sharma, and T. Kumar, A Handbook of Medicinal Plants (Complete Source Book), Agrobios Ltd., India (2004).
9. P. K. Warrier, V. P. K. Nambier, and C. Ramankutty, Indian Me-dicinal Plants (Compendium of 500 Species), CSIR, New Delhi,India (1990).
10. A. Shahat, N. S. Abdel-Azim, and F. M. Hammouda, Years of Natural Products Research: Past, Present and Future, Amster-dam (1999 – 2000).
11. Kamboj Pradeep et al (2010) Antihyperlipidemic effect of hydroalcoholic extract of Kenaf (*Hibiscus cannabinus* L.) leaves in high fat diet fed rats. vol1 (3): 174-181.
12. Harborne JB. *Phytochemical Methods.* 3rd ed. UK: Chapman and Hall; 1998. pp. 137–139.
13. Gao X, Ohlander M, Jeppsson N, Bjork L, Trajkovski V. Changes in antioxidant effects and their relationship to phytonutrients in fruits of sea buckthorn (Hippo phaerhamnoides L. *J. Agric. Food Chem.* 2000; 48:1485–1490.
14. Kosalec I, Bakmaz M, Repeliniak S, Vladimir- knezevic S. Quantitative analysis of the flavonoids in raw propolis from northern Croatia. *Acta Pharma.* 2004; 54:65–72.
15. Woolson RF. *Statistical Methods for the Analysis of Biomedical Data.* New York: John Wiley and Sons Inc; 1987. pp. 172–174.