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A Review on Study of Hepatoprotective Activity of Chenopodium Album Linnon CCl4 Induced Hepatotoxicity in Rats

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ABSTRACT

The hepatoprotective activity of *Chenopodium album* Linn leaves against carbon tetrachloride (CCl4)-induced hepatotoxicity was investigated. Possibilities of Rat hepatocyte monolayer culture and rats were used as in vitro and in vivo hepatoprotective screening models also very useful. In the *in vitro* studies, different extracts and fraction we can screened. Silymarin can be used as reference drug. In the *in vivo* studies, hepatotoxicity was induced in wistar rats species give satisfactory results as per reported methods and administering a mixture of CCl_4: olive oil (1:1, 2 ml/kg, s.c.) can be used for the inducible purpose. The extent of hepatotoxicity can be assessed by measuring the serum enzyme levels. So overall parameters consider for the CCl_4 induced hapatoxicity in rats.

Keywords: Antioxidant; Carbon tetrachloride; Chenopodium album; Hepatoprotective

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1. INTRODUCTION:

1.1 Plant profile: *Chenopodium album*

Chenopodium album is a fast-growing weedy annual plant in the genus *Chenopodium*. Though cultivated in some regions, the plant is elsewhere considered a weed. Common names include lamb's quarters, melde, goosefoot, manure weed, and fat-hen, though the latter two are also applied to other species of the genus *Chenopodium*, for which reason it is often distinguished as white goosefoot. It is sometimes also called pigweed. However, pigweed is also a name for several other plants in the family Amaranthaceae; it is used, for example, for the redroot pigweed (*Amaranthus retroflexus*).[1-3]

It tends to grow upright at first, reaching heights of 10–150 cm (rarely to 3 m), but typically becomes recumbent after flowering (due to the weight of the foliage and seeds) unless supported by other plants. The leaves are alternate and varied in appearance. The first leaves, near the base of the plant, are toothed and roughly diamond-shaped, 3–7 cm long and 3–6 cm broad. The leaves on the upper part of the flowering stems are entire and lanceolate-rhomboid, 1–5 cm long and 0.4–2 cm broad; they are waxy-coated, unwettable and mealy in appearance, with a whitish coat on the underside. The small flowers are radially symmetrical and grow in small cymes on a dense branched inflorescence 10–40 cm long. Further, the flowers are bisexual and female, with five tepals which are mealy on outer surface, and shortly united at the base.[14] There are five stamens.[4-6]

Figure 1: Plant of *Chenopodium album*

Table1: Plant Description

Kingdom:	Plantae
Clade:	Angiosperms
Clade:	Eudicots
Order:	Caryophyllales
Family:	Amaranthaceae
Genus:	*Chenopodium*
Species:	***C. album***
Binomial name	
Chenopodium album	

Chenopodium album Linn, commonly known as 'bathua', 'fat-hen' or 'lamb's quarters' belongs to family Chenopodiaceae. Due to high nutritional value, leaves are consumed as vegetables in many Asian countries. Traditionally, *C.album* is used as a curative medicine for various diseases including hepatic ailments. Chemically, the presence of phenolics, sterols, vitamins, carotenoids, flavonoids, phytoecdysteroids and minerals has been reported in *C.album* leaves. Many extracts and compounds from C.album leaves have been demonstrated to possess hypotensive, anti-inflammatory, antihelmintic, and anticancer activities.. Recently the hepatoprotective activity of *C.album* against paracetamol-induced hepatotoxicity has been reported. Our present study was aimed to investigate the protective potential of *C.album* leaves against carbon tetrachloride (CCl4)-induced hepatotoxicity and oxidative stress.

Liver is the most important organ, which plays a pivotal role in regulating various physiological processes in the body. It is involved in several vital functions, such as metabolism, secre tion and storage. It has great capacity to detoxicate toxic substances and synthesize useful principles.
Therefore, damage to the liver inflicted by hepatotoxic agents is of grave consequences. Liver diseases are mainly caused by toxic chemicals, excess consumption of alcohol, infections and autoimmune disorders. Most of the hepatotoxic chemicals damage liver cells mainly by inducing lipid peroxidation and other oxidative damages. In addition, serum levels of many biochemical mar kers like aspartate transaminase (AST), alanine transaminase (ALT), alkaline phosphatase (ALP) and bilirubin were also elevated. [7-10]

2. EXPERIMENTAL DESIGN AND PROCESS:

2.1 Plant material: The fresh leaves of *C.album* were procured from geographical source place and authenticated by botanist and toxologist. The fresh leaves were washed with tap water, shade dried and powdered.[11-12]

2.2 species of Animal: Wistar albino rats species (200-250 g) of either sex can be used for the experiments. Animal studies will be reviewed and approved by the Institutional Animal Ethics Committee. [11-12]

2.3 maintenance of animal: The animals were maintained under standard laboratory conditions of temperature (25 ± 2ºC) and humidity (55 ± 5%) with 12 h light- dark cycle.[11-12]

3. IN VITRO HEPATOPROTECTIVE ACTIVITY:

Hepatocytes were isolated from rat liver as per the reported method by Jain and Singhai. The isolated hepatocytes were suspended in William's E medium (pH 7.4) and seeded in collagen pre-coated culture plates at a density of 2 to 3 x 103 cells/well at 37ºC in humidified atmosphere of 5% CO2 in a CO2 incubator. After 24 h of culturing, cells were exposed to CCl4 (2.5 mM) with or without plant extracts/fractions (100 µg/ml) or silymarin (10 µM) and incubated for another 24 h at 37ºC in CO2 incubator. After 24 h incubation, the leakage of alanine transaminase (ALT) and lactate dehydrogenase (LDH) was determined in the culture medium. Acute oral toxicity studies The acute oral toxicity studies were performed following OECD guidelines.[13-14]

4. IN VIVO HEPATOPROTECTIVE ACTIVITY:

The experiment was conducted according to method described previously. Rats were randomly divided into six groups, each consisting of six rats and treated as follows: Group I (normal control): distilled water (1 ml/kg, p.o.) daily for 5 days and olive oil (1 ml/kg, s.c.) on days 2 and 3. Group II (CCl4 control): distilled water daily for 5 days and CCl4:olive oil (1:1, 2 ml/kg, s.c.) on days 2 and 3. Group III (positive control): silymarin (50 mg/kg, p.o.) daily for 5 days and CCl4:olive oil on days 2 and 3, 30 min after administration of silymarin. Groups IV–VI: Extract of plant materials (100, 200 and 400 mg/kg, p.o., respectively) for 5 days and CCl4:olive oil on days 2 and 3. On the 6th day, under ether anesthesia, blood and liver samples were collected and processed for biochemical estimations.[15]

5. CONCLUSION:

Chenopodium album Linn, commonly known as 'bathua', 'fat-hen' or 'lamb's quarters' belongs to family Chenopodiaceae. Due to high nutritional value, leaves are consumed as vegetables in many Asian countries. Traditionally, *C.album* is used as a curative medicine for various diseases including hepatic ailments. Chemically, the presence of phenolics, sterols, vitamins, carotenoids, flavonoids, phytoecdysteroids and minerals has been reported in *C.album* leaves. For *in-vitro* The isolated hepatocytes were suspended in William's E medium (pH 7.4) and seeded in collagen pre-coated culture plates at a density of 2 to 3 x 103 cells/well at 37ºC in humidified atmosphere of 5% CO2 in a CO2 incubator. After 24 h of culturing, cells were exposed to CCl4 (2.5 mM) with or without plant extracts/fractions (100 µg/ml) or silymarin (10 µM) and incubated for another 24 h at 37ºC in CO2 incubator.for in-vivo Rats were randomly divided into six groups, each consisting of six rats and treated as follows: Group I (normal control): distilled water (1 ml/kg, p.o.) daily for 5 days and olive oil (1 ml/kg, s.c.) on days 2 and 3. Group II (CCl4 control): distilled water daily for 5 days and CCl4:olive oil (1:1, 2 ml/kg, s.c.) on days 2 and 3. Group III (positive control): silymarin (50 mg/kg, p.o.) daily for 5 days and CCl4:olive oil on days 2 and 3, 30 min after administration of silymarin. Groups IV–VI: Extract of plant materials. Protective potential of *C.album* leaves against carbon tetrachloride (CCl4)-induced hepatotoxicity and oxidative stress.

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