



## HEPATOPROTECTIVE ACTIVITY OF *CHENOPODIUM ALBUM* LINN. PLANT AGAINST PARACETAMOL-INDUCED HEPATIC INJURY IN RATS

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### ABSTRACT

Fine powder of *Chenopodium album* Linn. leaves is dusted to ally irritation and leaf juice is used for treating burns. Decoction of aerial parts mixed with alcohol is rubbed on the body affected part by arthritis and rheumatism. The present investigation describes hepatoprotective activities of dried whole plant of *Chenopodium album* Linn, acetone and methanol extracts, in ratio of (50:50) against paracetamol induced hepatic injury. Hepatic injury was achieved by injecting 2.5ml/kg oral route of paracetamol in equal proportion with dimethylsulfoxide (DMSO). Acetone and Methanol extract at dose levels of 200 and 400 mg/kg offered significant ( $P<0.001$ ). Hepatoprotective action by reducing the serum marker enzymes like serum glutamate oxaloacetate (SGOT), serum glutamate transaminase (SGPT). They also reduced the elevated level of serum alkaline phosphatase (ALP) serum acid phosphatase (ACP) and serum bilirubin. Reduced enzymic and nonenzymic antioxidant levels and elevated lipid peroxide level were restored to normal by administration of methanol and acetone extract of *Chenopodium album* Linn. Histopathological studies further confirmed the hepatoprotective activity of these extracts when compared with Paracetamol treated control groups. The result obtained were compared with silymarin (100mg/kg; oral), the standard drug. In conclusion Acetone and Methanol extract at (400mg/kg, oral) showed significant  $p<0.001$  hepatoprotective activity similar to that standard drug, silymarin.

**Keywords:** *Chenopodium album* Linn, Hepatoprotective activity, Paracetamol, Flavonoids.

### INTRODUCTION

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, secretion 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<sup>1</sup>. In addition, serum levels of many biochemical markers like aspartate transaminase (AST), alanine transaminase (ALT), alkaline phosphatase (ALP) and bilirubin were also elevated<sup>2</sup>. In absence of a reliable liver protective drug in the modern system of medicine, a number of medicinal preparations in Ayurveda, the Indian system of medicine, are recommended for the treatment of liver disorders. Natural remedies from medicinal plants are considered to be effective and safe alternative treatments for hepatotoxicity<sup>3</sup>.

### MATERIAL AND METHODS

#### Plant material

The parts of *Chenopodium album* Linn (Chenopodiaceae) were collected from Village Nathubadkheda Bhopal Capital of Madhya Pradesh during October 2009. The plant was identified by Dr. Zeaul Hasan, department of Botany Safia Science College, Bhopal. A Voucher specimen no. 140/Bot/Safia/2010 of the plant was deposited in the herbarium of the Pharmacognosy department of RKDF college of Pharmacy, Bhopal.

#### Preparation of extract

The dried parts of *Chenopodium album* Linn were extracted by petroleum ether, methanol and acetone in ratio (50:50) by using Maceration process. The extracts obtained were dried on water bath at temperature 40°C to get the crude pet ether extract 41% and acetone methanol extract in ratio (50:50) 41.74% respectively.

#### Phytochemical screening

The known quantity of dried powdered drug was extracted by maceration with pet ether, methanol and Acetone in ratio (50:50) (Table.1) was tested for different constituents viz. steroids and triterpenoids (Liebermann-Burchard reaction), flavonoids (Shinoda test), alkaloids (Mayer's reagent), tannins (Ferric chloride test) and

sugar (Fehling solution test). The phytochemical investigations revealed that flavonoids, tannin, phenolic compound, saponins and alkaloids were present in methanol and acetone, alkaloids and flavonoids were present in petroleum ether fractions<sup>4</sup>.

#### Animal

Wistar albino rats (150-200g) of either sex roughly of the same age (8-10 weeks) were used for the present studies. They were housed in clean polypropylene cages (3 in each) and maintained in standard laboratory condition at ambient temperature (25±20°C) with relative humidity (55-64%) and light and dark conditions (12/12h). They were provided commercial water and food. The experiments and procedure used in the study were approved by Institutional animal ethical committee (IAEC) its ethical clearance No. is 1283/c/09/CPCSEA.

#### Chemicals

Silymarin, (Sigma chemicals, USA), C<sub>2</sub>H<sub>5</sub>OH, disodium hydrogen phosphate (Na<sub>2</sub>HPO<sub>4</sub>) Hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), dihydrogen potassium phosphate anhydrous (KH<sub>2</sub>PO<sub>4</sub>) and thiobarbituric acid were purchased from Merck India Ltd, Mumbai India.

#### Assessment of hepatoprotective activity

The animals were divided into six group's six animal each group. Group I served as normal control were administered oral single daily dose of 5% dimethyl sulphoxide (DMSO) on all 7 days. Group II served as paracetamol controlled 500mg/kg oral single daily, on all 7 days and group III-VI, served as *Chenopodium album* treated groups were administered Acetone and Methanol (50:50) extracts (200 and 400mg/kg, oral) all 7 days and a single dose of paracetamol (500mg/Kg) oral on days 7 and 30 min after extracts administrations and group V Silymarin, the known hepatoprotective compound (25mg/kg oral) for 7 days and a single dose of paracetamol (500mg/Kg) oral, on days 7, 30 min after silymarin administration. The food was withdrawn on preceding night of the experiment. On 8th day all the animals were sacrificed by mild ether anesthesia. Blood sample were collected from heart of each animal. Serum was separated for the estimation of the biochemical markers and liver was dissected out for the determination of histology studies liver tissue was collected<sup>5</sup>.

#### Determination of enzyme level

The activities of serum glutamate pyruvate transaminase (SGPT), and serum glutamate oxaloacetate transaminase (SGOT) estimation

of serum ALP, serum Bilirubin [Total and direct] were assayed by the reported methods in reference 6 and carried out to assess the acute hepatic damage caused by Paracetamol<sup>6</sup>.

**Table 1: Phytochemical screening of extracts**

Pytoconstituents	Qualitative abundance	
	Pet. Ether	Acetone: Methanol (50:50)
Alkaloids	+	++
Glycosides	-	-
Flavonoids	+	+++
Carbohydrates	-	-
Tannin and Phenolic compounds	-	+
Steroids	-	-
Saponins	-	+

Levels of phytoconstituents were qualitatively determined based on chemical groups and thin layer chromatography on the following scale, - absent +present at low level, ++ present at moderate level, +++ present at high level.

#### Histopathological Examination

Small pieces of liver tissues were collected in 10% formalin for proper fixation. These tissues were processed and embedded in paraffin wax. Section of 5-6 microns in thickness were cut and

attained with hematoxylin and eosin. All the sections of the tissues were examined under microscope for the analyzing the altered architecture due to the liver tissue due to CCl<sub>4</sub> and paracetamol challenge and improved liver architecture due to pretreatment with test extracts and standard drug. These were examined under the microscope for histopathological changes

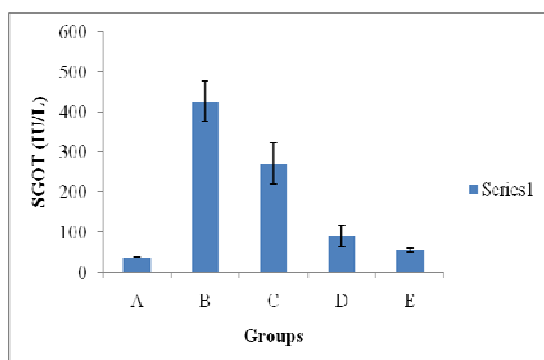
such as congestion, hemorrhage, necrosis, inflammation, Infiltration, kuffer cell and sinusoids and photographs were taken. The photographic figures are given as an evidence for the improved architecture of the liver due to pretreatment with test extracts and standard drug in both the models of our study<sup>7</sup>.

#### Statistical analysis

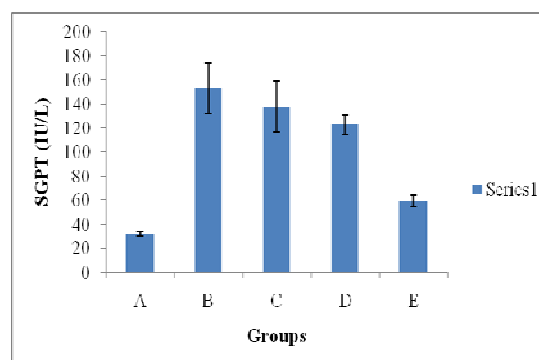
The data represents mean  $\pm$  SD. Results were analyzed statistically by one way ANOVA followed by Bonferroni's multiple comparison test between the data of control and treated groups using SPSS software (students' version ), the minimum level of significance was set up at  $p < 0.05$  or less.

#### RESULTS

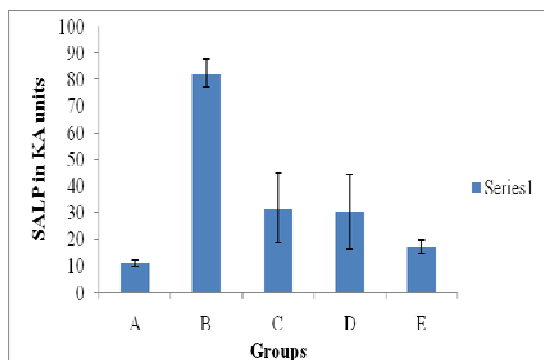
On preliminary phytochemical analysis various fraction of *chenopodium album* Linn have shown the presence of flavonoids, alkaloids, saponins, tannins and Phenolic compounds represented in table-1. Administration of Methanol and Acetone (50:50) extract at 200mg/kg and 400mg/kg remarkably prevented Paracetamol elevation of serum enzymes. graph 1(a), graph 1(b), graph 1(c), graph 1(d) and graph 2(a), graph 2(b), graph 2 (c) and graph 2 (d).



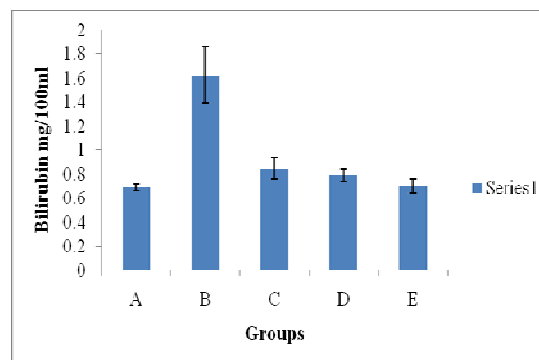
**Graph 1(a) For SGOT**



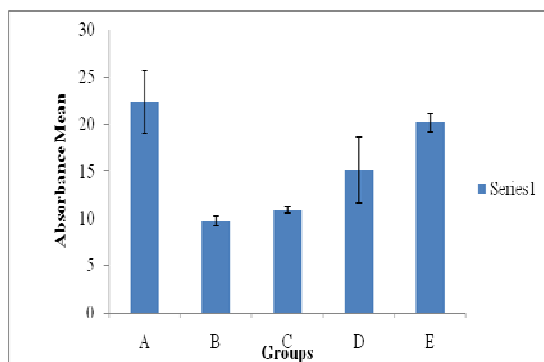
**Graph 1(b) For SGPT**



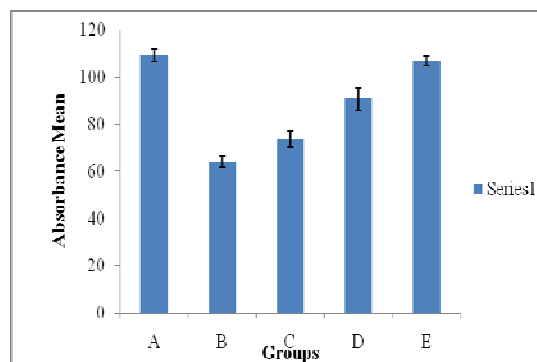
**Graph 1(C) For SALP**



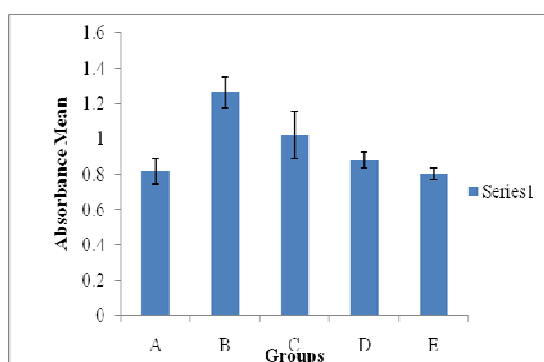
**Graph 1(d) For Bilirubin**



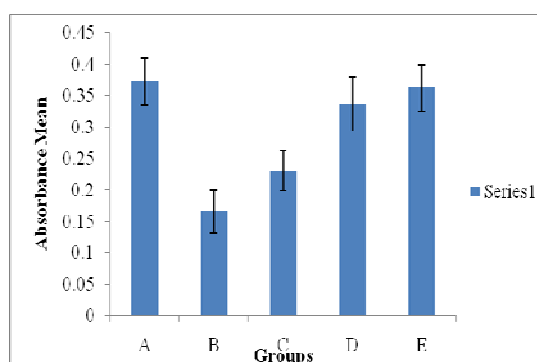
Graph 2 (a) For SOD



Graph 2 (b) For CAT



Graph 2 (c) For LPO



Graph 2 (d) For GSH

Here:

**Gr-1:NC- Normal control:** (5ml/kg b.wt Dimethyl sulphoxide (DMSO).

**Gr-2: PC- Paracetamol Control:** (500 mg/kg b.wt. Oral dose)

**Gr-3: Paracetamol+ chenopodium album extract:** 1(500mg/kg b.wt +200mg/kg b.wt. oral dose)

**Gr-4: Paracetamol+ chenopodium album extract:** 1(500mg/kg b.wt. +400mg/kg b.wt. oral dose)

**Gr-5: Paracetamol+Silymarin:** (500mg/kg b.wt.oral dose + 25mg/kg b.wt oral dose )

## DISCUSSION

It can be concluded from this investigation that, among the acetone and methanol (50:50) extracts tested, the (200mg/kg) of the plant *Chenopodium album* possess more effective hepatoprotective activity against Paracetamol intoxication in rats because of its Flavonoid bearing capacity. Our further detailed studies may, however, confirm the utility profile of this drug.

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