INTERNATIONAL RESEARCH JOURNAL OF PHARMACY
Available online www.irjponline.com

ISSN 2230 – 8407
Research Article

HEPATOPROTECTIVE ACTIVITY OF ETHANOLIC EXTRACT OF *ALTHAEA OFFICINALIS* LINN AGAINST CARBON TETRACHLORIDE INDUCED HEPATOTOXICITY ON ALBINO WISTAR RATS

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Article Received on: 10/10/11 Revised on: 21/11/11 Approved for publication: 16/12/11

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ABSTRACT
In Indian traditional system of medicine, herbal remedies are prescribed for the treatment of various diseases including liver diseases. The present study was aimed to investigate the hepatoprotective activity of the ethanolic extract of *Althaea officinalis* against Carbon tetrachloride induced hepatotoxicity in rats. Liver function were assessed by the determination of SGPT and SGOT studies. The serum biochemical analysis results suggested that the use of ethanolic extract of *Althaea officinalis* exhibited significant protective effect from hepatic damage in CCl_4 induced hepatotoxicity model.

Key Words: *Althaea officinalis,* Carbontetra chloride, hepatotoxicity.

INTRODUCTION

Liver is the important vital organ, regulating various physiological processes such as, metabolism, secretion, storage and detoxification of toxic substances. Therefore, damage to the liver inflicted by hepatotoxic agents is of great concern[1]. The hepatotoxicity mainly caused by toxic chemicals such as CCl_4 alcohol, drugs such as paracetamol and antidiabetic drugs. The use of plant extracts for the treatment for liver diseases are now on the increase. Plants that were once considered of no value are now being investigated, evaluated and developed in to drugs with no side effects. One of such plants is *Althaea officinalis* commonly known as *Gulkhairo* belongs to the family Malvaceae and is widely distributed throughout the world as a useful medicinal plant. *Althaea officinalis* is found in the Himalayan region from Kashmir to Punjab and cultivated in Kullu valley in Himachal Pradesh[2]. The roots counteract excess of stomach acid, and are prescribed to treat peptic ulcer, gastritis and intestinal problems including ileitis, colitis, diverticulitis and irritable bowel syndrome. An ointment prepared from the roots is applied to cure inflammatory tumors, burns, boils and abscesses. A root decoction is utilized as mouth wash to relieve inflammation[3] bruises, sprain; as an expectorant in cough hoarseness of voice, bronchitis and whooping cough[4]. The present study was undertaken to investigate the effects of extract on liver cells of albino wistar rats.

MATERIALS AND METHOD

Plant material

The dried roots of *Althaea officinalis* were purchased from Khari Baoli market of Delhi. The authenticity of the material was established by Prof. M.P. Sharma, the Department of Botany, Faculty of Science, Jamia Hamdard, New Delhi. A voucher specimen No-PRL/ JH/08/38 in deposited in the herbarium of the Department of Pharmacognosy and Phytochemistry, Jamia Hamdard, New Delhi.

Preparation of extract

The dried plant material (250 g) was crushed and extracted exhaustively with alcohol in a Soxhlet apparatus. The solvent was removed under reduced pressure. The yield of the extract was 5.6% in terms of starting material. The dried alcoholic extract was fractionated by heating successively with petroleum ether and water soluble and water insoluble and the solvents were removed as to give "PET (88 g)" "WS (50 g)" and "WIS (13 g)", respectively. Healthy albino rats of either sex (180-200 g) were divided into five groups of six animals each. The same quantity of food in the form of pellets was given to all animals. The plant extracts were administrated in the form of suspension.

Experimental Animals

Albino rats of wistar strain 180-200 g used in the experiments were obtained from the Central Animal House, Jamia Hamdard, The animals were kept under standard laboratory condition 28 ±1 °C. The animals were fed with standard diet.

Administration of hepatotoxins

Carbon tetrachloride was mixed with liquid paraffin in a ratio of 1:1 and 1.5 ml/kg mixture was given orally to each rat. The effect of the toxicant was ascertained by measuring biochemical parameters.

Administration of drug fractions

The drug treatment was followed for 7 days after CCl_4: paraffin administration. The treatment was given orally in the form of suspension (1% Tween). On the last day, two rats from each group were sacrificed and serum from 5 animals was taken for biochemical evaluation. The blood was taken out from the retro-orbital sinus, allowed to coagulate at 37°C for 30 min and serum was separated by centrifugation at 3500, rpm for 10 min.

Experimental Design

Animals were divided into five groups, consisting of six animalsin each group. Group I served as vehicle control which received 5% Tween 80 (10ml/kg) body weight. Group II received CCl_4 (1ml/ kg), Group III received CCl_4 (1ml/ kg) and PET(100 mg/kg) body weight, Group IV received CCl_4 (1ml/ kg) and WS (100 mg/kg) body weight, Group V received CCl_4 (1ml/ kg) and WIS (100 mg/kg) body weight, simultaneously for 7 days.

Estimation of serum SGOT, SGPT

On last day the blood samples were collected by cardiac puncture and serum was separated and used for the determination of biochemical parameters of SGPT and SGOT. Colorimeteric method was followed to determine the Serum glutamate pyruvate transminase (SGPT) level by using the method described by Reitman et al, (1957) King and king(1954) method was employed(ALP).

Statistical Analysis

The data of biochemical estimation was reported as ± S.Ewhere n=5. For determining the statistical significance one way analysis of variance (ANOVA) and Dunnett's test were used. P- values of less than 0.05 were considered significance.

RESULT AND DISCUSSION

Increased level of serum SGOT and SGPT were observed in disease induced control groups, but in different dose levels of test drug treated groups, significant (P< 0.001) reduction SGOT, SGPT was

observed (Fig1,2,3,4). In this study different fraction (Petrol soluble, water soluble and water insoluble) dependent activity was observed.

Carbon tetrachloride (CCl_4) is a potent hepatotoxin and a single exposure to it can rapidly lead to an increase in the Level of several enzymes, centrizonal necrosis and steatosis[5]. The hepatotoxicity induced by CCl_4 is due to its metabolite CCl_3- , a free radical which bind to lipoprotein and leads to endoplasmic reticulum[6]. The ability of a hepatoprotective drug to reduce the injurious effects or to preserve the normal hepatic physiological mechanisms, which have been distributed by a hepatotoxin, is in index of its protective effects. The lowering of enzymes level is a definite indication of the hepatoprotective action of the enzymes due to altered membrane permeability[7]. Although the doses of *Althaea officinalis* offer hepatoprotection, the dose of PET (100mg/kg b.w) is more effective (Table 2) depending on the type of cell and the membrane involved, lipoperoxidation due to CCl_4 result in heamolysis. The *Althaea officinalis* may be used in the acute condition of jaundice. Simultaneously treatment of ethanolic extract with CCl_4 produces lesser degree of damage to the animas treated with CCl_4 alone. The section of the liver treated with ethanolic extract (100mg/kg b.w) and CCl_4 level better showed hepatoprotective activity almost similar to the control group. The transport function of the hepatocytes is distributed in hepatic injury, causing the leakage. Their oxidative decomposition of the lipid is initiated and organic peroxides are formed after reacting with O_2 (lipid peroxidation). The reaction is autocatalytic in that new radicals are formed from the peroxide radicals themselves. CCl_4 induced liver cell injury is both severe and extremely rapid in onset, within less than 30 min, there is a decline in hepatic protein synthesis ; within 2 hrs ,there is swelling of smooth endoplasmic reticulum and dissociation of ribosomes from the rough endoplasmic reticulum. Lipid export from the hepatocytes is reduced, resulting fatty liver of CCl_4 poisoning. Mitochondrial injury then occurs and this is followed by progressive swelling of the cells due to increased permeability of the plasma membrane. Finally cell death following massive influx of calcium ions.

The *Althaea officinalis* may be used in the acute condition of jaundice. Simultaneously treatment of ethanolic extract with CCl_4 produces lesser degree of damage to the animas treated with CCl_4 alone. The section of the liver treated with ethanolic extract (100mg/kg b.w) and CCl_4 revel better hepatoprotective activity almost similar to the control group. The petroleum ether and water soluble fractions and water insoluble fraction of the alcoholic extract of the *A. officinalis* roots showed decrease in SGOT and SGPT levels in carbon tetrachloride induced hepatotoxicity in rat models. There was slight variation of SGOT levels when the rats were treated with these fractions. However, the level of SGPT decreased more effectively with the petroleum ether fraction than aqueous fractions. The total alcoholic extract decreased SGPT and SGOT levels significantly on the rat models.

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Table 1: Effect of the alcoholic extract of *Althaea officinalis* roots on SGOT and SGPT in rat model

Group	SGOT	% changes	% inhibition	SGPT	% changes	% inhibition
Control	.65±6.2	-	-	.32±.004	-	-
Toxicant(CCl_4), (1 ml/kg)	.89±.008	100%	-	.69±.004	100%	-
Toxicant(CCl_4)+ (alcoholic extract)(1ml/kg+100 mg/kg)	.68±.01	23.5%	76.5%	.42±.004	39.1%	60.9%

Table-2. Effect of the various fractions of *Althaea officinalis* roots on SGOT and SGPT in rat model

Group	SGOT	% changes	% inhibition	SGPT	% changes	% inhibition
Control	0.65±.01	-	-	0.33±.008	-	-
Toxicant (CCl_4),(1ml/kg)	0.90±.008	100%	-	0.82±.004	100%	-
PET+Toxicant (CCl_4),100+1 ml/kg	0.77±.01	11.7%	88.3%	0.53±.01	35.6%	64.4%
WS+Toxicant (CCl_4), 100+1ml/kg	0.71±.008	17.1%	82.9%	0.71±.008	9.02%	90.98%
WIS+Toxicant (CCl_4), 100+1 ml/kg	0.70±.02	18%	82%	0.7±.02	9.84%	90.16%

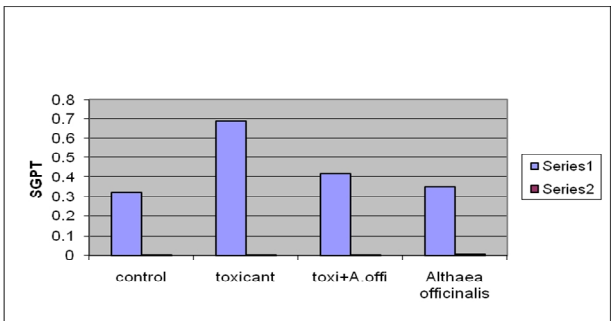

Fig .1 Effect of the alcoholic extract of *Althaea officinalis* roots on SGPT in rat model

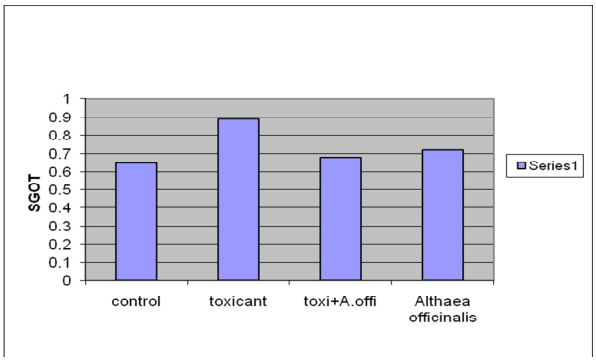

Fig .2 Effect of the alcoholic extract of *Althaea officinalis* roots on SGOT in rat model

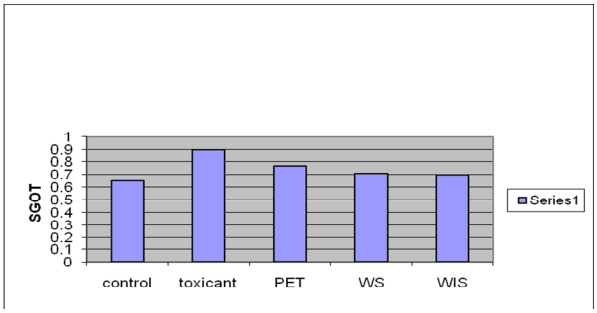

Fig .3 Effect of petroleum ether soluble, water soluble, and water insoluble of ALC extract of *Althaea officinalis* on SGOT in carbon tetrachloride induced hepatotoxicity in rat model

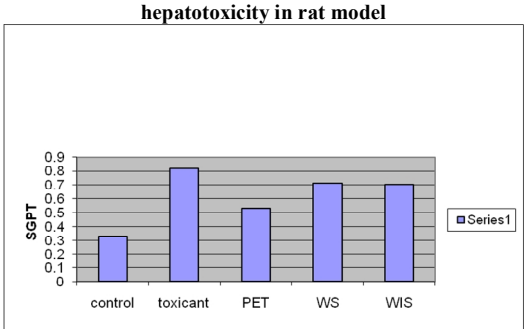

Fig .4 Effect of petroleum ether soluble, water soluble, and water SGPT in carbon tetrachloride induced hepatotoxicity in rat model

Source of support: Nil, Conflict of interest: None Declared