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Research Article

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Hepatoprotective Activity of Extract of *Erythroxylum monogynum* in Albino Rats

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ABSTRACT

Development in the science is helping the people to have the knowledge of unknown things. In that attempt, finding the plants as the best therapeutic option for the health problems and making them familiar to the people. The present experiment was conducted for 7 days to evaluate the hepatoprotective activity of Erythroxylum monogynum in CCl_4 (1ml/kg) induced rats. The hydroalcoholic extract of plant was prepared by maceration technique. The 5 group of rats were maintained as Control, CCl_4 induced, CCl_4+ Liver tonic, CCl_4+extract 150mg/kg and CCl_4+extract 200mg/kg. On the 8^{th} day blood was collected by retro orbital puncture for the study of serum parameters like SGOT (Serum Glutamate Oxaloacetate Transaminase), SGPT (Serum Glutamate Pyruvate Transaminase) and bilirubin. Then the liver separated and processed for the histological studies. The decreased levels of SGOT, SGPT, total bilirubin in the treated rats were an indication of the hepatoprotective activity of extract. The regeneration of hepatocytes was also evidence for hepatoprotective activity of extracts.

Keywords: *Hepatoprotective activity, SGOT, SGPT, Liver tonic, Necrosis.*

INTRODUCTION

Though the Science is enormously developed certain diseases and syndromes are not controlled. Some of the diseases like cancer, HIV, malaria etc. are still in the mind of Scientists to which they are unable to find out solution to cure completely. Though, the development is enormous in various fields the poor people unable to get the treatment facility. That's why the people preferring the local doctors. Sometimes the treatment of those practitioners may workout or not. The ancient practitioners for medicine depending on the plants can solve the various diseases. Among them there are several plants that have the capacity to combat against the liver diseases.

Liver is vital organ, which is maintaining of metabolic reactions in the human body. But unnecessary food habits, consuming of impure drinks may bring problems in functioning of the liver. Consuming more number of drugs also cause the liver damage, intake of alcohols, junk food etc are also questioning the functional ability of the liver by damaging the liver architecture. Damage of liver can be assessed by the elevated levels of serum enzymes like SGOT, SGPT and bilirubin[1]. Though the allopathic drugs are available they are not fulfilling the solution. But the medicinally important plants are capable to target these types of problems. In that attempt many plants are proved that they possess the hepatopotective activity[2].Plants having the capability of fighting against free radicals generated in the body leads to protect of vital organs like liver.

The present work is to find out the free radical scavenging activity and liver protection activity of leaf extracts of *Erythroxylum monogynum* against CCl_4 induced hepatic damage.

MATERIALS AND METHODS

Plant material

Erythroxylum monogynum plants were brought from the forest area of the Gudur Village, Warangal district. The plant was identified and authenticated by Prof. V.S. Raju, Department of Botany, Kakatiya

University, Warangal. The plants materials are generally practiced by the village tribal people for various ailments. They are getting relief of inflammations, skin diseases, malaria, and stomach ache[3].

Preparation of plant extract

The leaves were dried under shade and the powder was prepared from dried leaves. 50g of powder was mixed in 250 ml of hydroalcoholic solvent (70% of ethanol, 30% of distilled water) and allowed for 24 hrs with the random shaking. Then the filtrate-I was collected and the marc dissolved in 250 ml of hydroalcoholic solvent for 24 hrs and collected the filtrate-II. Then the filtrates (I&II) were distilled to get extracts and stored in refrigerator prior to treatment.

Animal models

Albino rats (Wistar strain) weighing 150 to 200gr were brought from Mahaveer Enterprizers, Hyderabad. The rats were housed and acclimatized to standard laboratory conditions (25º C, 50-60 % of humidity) with the approved protocol of Institutional Animal Ethical Committee (IAEC/03/ UCPSc/KU/10). The animals were fed with standard diet (Hypro feed for animals, Pune) and water ad libitum.

Toxic study of the extracts

To study the toxicity of extracts the doses 150,200,250,300 mg/ kg of extracts were administered to the rats (4 groups – 6 animals in each group) and put under observation for 7 days[4]. There was no toxic effect observed to the rats up to 300 mg/kg and the 150 and 200 mg / kg were selected for the experiment.

Experimental design for hepatoprotective activity

The animals were divided into 5 groups of 6 in each

Group-1: Control- Treated with dist. water for 7 days

Group-2: CCl_4 (Carbon tetra chloride) was given (i.p., 1ml/ kg) with 1:1 dilution of coconut oil on the 5th day[5].

Group-3: Administered with liver tonic (LIV – 52 Syrup, with the dose 5ml/kg) daily for 7 days and on 5th day the CCl_4 (1 ml / kg) was given through i.p.

Group - 4: Treated with extract 150mg/ kg for 7 days and the CCl_4 induced on 5th day[5].

Group -5: Treated with extract 200 mg/kg for 7 days and the CCl_4 induced on 5th day[5].

On the 8th day, blood samples were collected through plexus from all rats and they were sacrificed. The collected blood was centrifuged and separated serum samples were used for estimation of SGOT, SGPT and bilirubin (through commercially available kits) tests for the study of the toxic effect of CCl_4 and also the therapeutic effect of the plant extracts. The livers were fixed in the fixative (Bouin's fluid) and processed further for histological studies. The results were analyzed by one way ANOVA followed by Dunnet multiple comparison test with the significant level at $p<0.05$.

RESULTS

The results were observed that the serum parameters like SGPT values were increased in the CCl_4 induced rats. The elevated SGOT, bilirubin values were also indicating the damage of the liver in the CCl_4 induced rats. The values of SGOT, SGPT and bilirubin were significantly decreased in the group CCl_4 + Liver tonic. The decreased levels of SGPT, SGOT and bilirubin levels were also seen in the CCl_4+150mg/kg and CCl_4+200mg/kg extract treated groups.

DISCUSSION

CCl_4 damages the liver by its metabolite $CCl_3^{\cdot}$ free radical, with which the damage of cellular membranes occur through the lipid peroxidation[6]. The serum parameters like Serum Glutamate Oxaloacetate Transaminase (SGOT) or Aspartate aminotransferase (AST), Serum Glutamate Pyruvate Transaminase (SGPT) or Alaline aminotransferase (ALT), including the bilirubin content also elevated because of their release into the blood in the CCl_4 induced hepatotoxic rats[7] (Table-1, Chart- 1). Whereas, the extract treated rats' serum parameters revealed the significant decrease in the SGOT, SGPT and bilirubin levels compare to the CCl_4 induced rats (Table-1, Chart - 1 and 2). These enzymatic values were also decreased in the liver tonic treated rats. The hepatoprotection of the drug depends on the reduced effects of toxic levels of the CCl_4 in the damaged liver[8]. The results that decreased levels of SGOT, SGPT and bilirubin

in the extract treated rats against CCl_4 were observed similar to the results of the hepatoprotective activity of poly herbal drug against CCl_4 damaged liver[9, 10].

The histological sections were also revealed that necrosis of hepatocytes occurred in the CCl_4 induced hepatotoxic group (group- 2) (figure-2). The group – 4 and group - 5 were showed the rearrangement of damaged cells. The reformation of hepatocytes was observed in histology of group – 5 (figure- 4, 5) rats. The histology can be easily comparable with the CCl_4 + liver tonic group rats (figure- 3).

The dose 200mg/kg showed that serum enzymes were decreased more than to the dose of 150mg/kg in the extracts treated rats. The hepatoprotective activity is increased according to the dose.

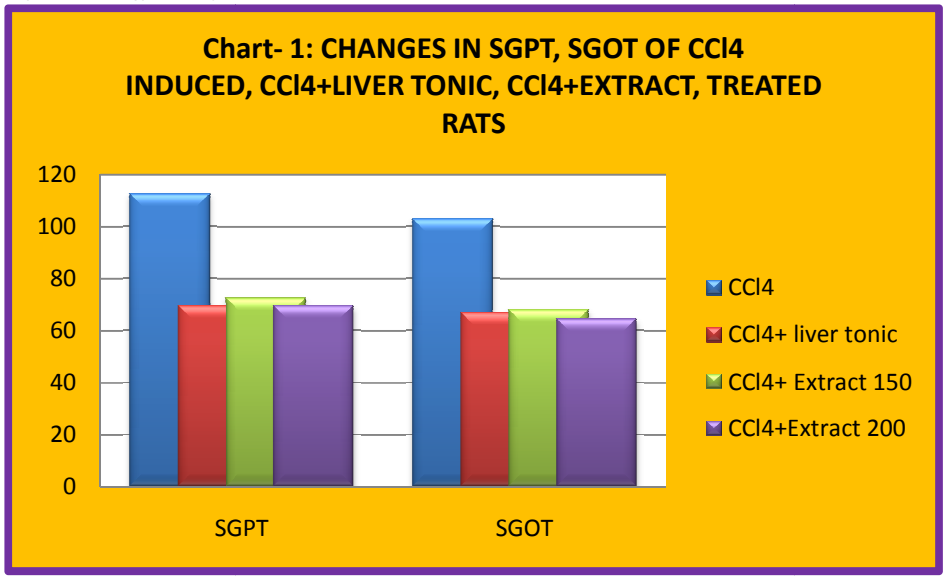
Table – 1: Hepatoprotective Activity of *Erythroxylum monogynum* in CCl_4 induced albino rats

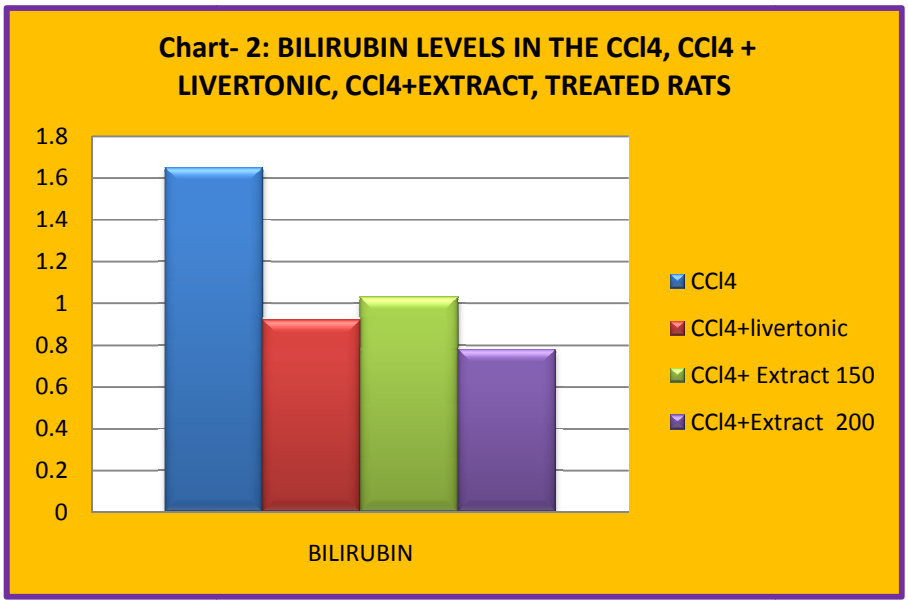
GROUPS	SGPT (IU/L)	SGOT (IU/L)	BILIRUBIN (mg/dL)
1.CONTROL	52.73±0.73	42.66 ± 0.55	0.64±0.08
2.CCL_4	112.60±4.51	102.88±1.79	1.65±0.15
3.CCL_4 + Liver Tonic	69.54±1.63	66.99±0.86	0.92±0.14
4.CCL_4 + Extract 150 mg	72.48±1.72[a]	68.03±1.23[a]	1.03±0.16[a]
5.CCL_4 + Extract 200 mg	69.56±3.90[a]	64.49±2.30[a]	0.78±0.06[a]

All values are expressed in mean ± SD; n=6

a= p <0.01 compare to CCl_4 induced group,

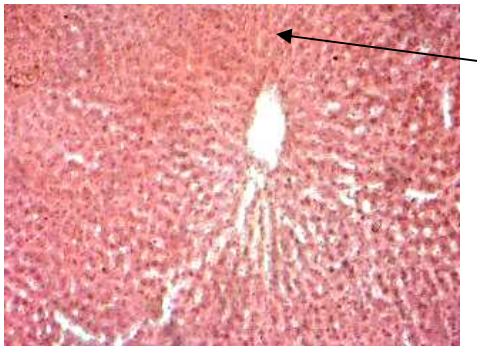
Extract- *Erythroxylum monogynum* hydroalcoholic extract





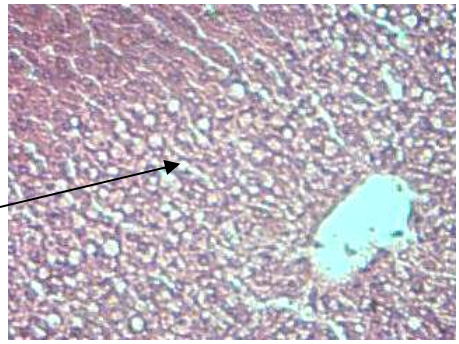
Histological sections of liver

Fig. 1



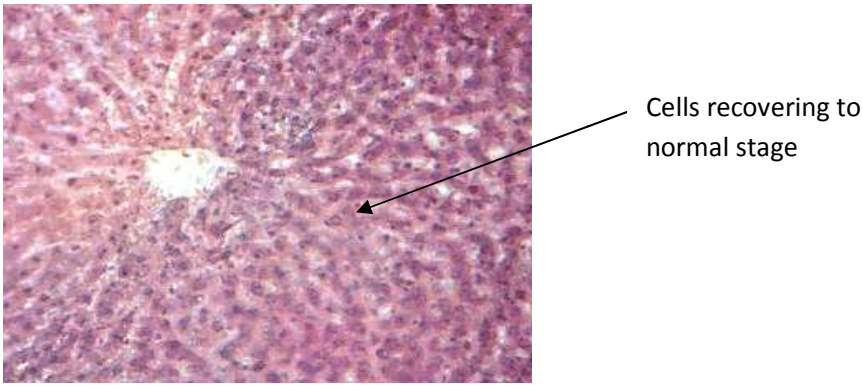
Liver of control rat showing normal histology

Fig. 2



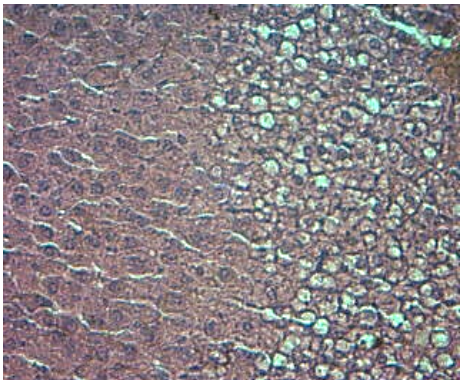
Histology of liver with CCl_4 damage

Fig. 3



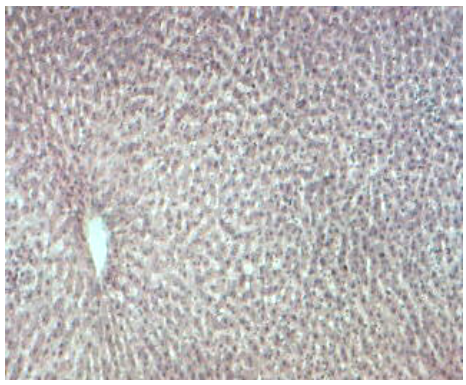
Histology of liver treated with CCl_4 + liver tonic

Fig. 4



Histology of liver treated with CCl_4+Extract 150mg/kg

Fig. 5



Histology of liver treated with CCl_4 + Extract 200mg/kg

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