Asian Journal of Chemistry Vol. 19, No. 4 (2007), 2923-2927

Hepatoprotective Activity of *Borreria articularis* (Linn.) against Paracetamol Induced Liver Damage in Rats

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The hepatoprotective activity of *Borreria articularis* was studied on paracetamol induced hepatic damage in rats. The hepatic damage was studied by assessing the biochemical parameters like serum total bilirubin, total protein, alanine transaminase, aspartate transaminase and alkaline phosphatase. Treatment with aqueous extract of *Borreria articularis* was found to protect the rats from hepato-toxic action of paracetamol as evidenced by significant reduction in the elevated serum transaminase levels. The hepatoprotective activity was also supported by histopathological studies of liver tissue.

Key Words: Paracetamol toxicity, Hepatotoxic, *Borreria articularis*, Medicinal plant.

INTRODUCTION

Paracetamol (acetaminophen) is a widely used analgesic antipyretic agent which is metabolized by the liver. Liver injury caused by toxic chemicals and certain drugs has been recognized as a toxicological problem. Herbal drugs are playing an important role in health care programs worldwide and there is a resurgence of interest in herbal medicines for treatment of various ailments including hepatopathy. India, the abode of Ayurvedic system of medicine, is the home of many plants. Hepatoprotective effect of some plants like *Andrographis paniculata*[1], *Acanthus ilicifolius*[2], *Cassia foro*[3], *Picorhiza huroa*[4], *Azadirachta indica*[5] *etc.* has been well established.

Borreria articularis (Linn.) of family Rubiaece is being used for blindness, ear ache, fever, spleen complaints, pimples, sores, dysentery, stings and also for stomach pain *etc*[6]. The roots, seeds and leaves are used for hemorrhoids, gall stones, diarrhoea, headache, mouth wash to cure toothache. In Bihar, the tripes of Hazarihagh[7] were used the roots externally for ulcers and as an antiseptic for wounds. In the present study, the effects of aqueous extract of *Borreria articularis* was screened for hepatoprotective activity in albino rats using paracetamol as hepatotoxin.

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EXPERIMENTAL

Leaves of *Borreria articularis* (Linn.) were collected from the surrounding fields of Therkukadu village, Thiruvarur district of Tamil Nadu, India. The plant was previously identified and authenticated by Prof. M. Noor Mohamed, Head of the Department of Botany, Khadir Mohideen College, Adirampattinam. The leaves were cleaned and shade dried. The dried leaves were made into powder. 100 mg of powder was dissolved in 1 mL of saline and this aqueous suspension was used in the experiments.

Animals and exposure conditions: Twenty five female albino rats (weighing 150-200 g) were purchased from local dealer. They were housed under standard conditions for 1 week to get acclimatized with the laboratory environment and maintained on commercial pelleted feed and water *ad-libitum*. The animals were housed at a temperature of 25 ± 1ºC with a 12 h light/dark cycle. Ethical clearance for the use of animals was obtained from the committee constituted for the purpose.

Experimental design: Rats were randomly divided into five groups of 5 rats each. All other groups received paracetamol (200 mg/kg, p. o, aqueous solution)[8] for 7 d. The groups were treated as follows:

Group I: Normal control.
Group II: Paracetamol orally for 7 d.
Group III: Paracetamol + *B. articularis* 1 g/kg orally for 7 d.
Group IV; Paracetamol + *B. articularis* 2 g/kg orally for 7 d.
Group V: Paracetamol + *B. articularis* 3 g/kg orally for 7 d.

Group II animals were maintained as toxic control without any pretreatment with the drug. Group III, IV and V were the experimental group animals. The drug treatment was carried out orally from 1st day to 7th day. Leaf extracts, paracetamol was administered with the help of a feeding cannula. 16 h after administration of last dose of drugs, animals were sacrificed by decapitation. The blood was collected and serum obtained after centrifugation was used for various biochemical estimations. The livers excised, rinsed cleaned in saline and preserved in 10 % formalin for histopathological study [using heamotoxylin eosin staining technique]. Results were statistically analysed.

Biochemical estimations: Serum was separated from the blood and subjected to various biochemical parameters like aspartate transaminase (AST)[9], alanine transaminase (ALT)[10], alkaline phosphatase (ALP)[11], acid phosphatase (ACP)[12], serum bilirubin[13] and protein were estimated.

RESULTS AND DISCUSSION

Table-1 shows that the values of AST, ALT, ALP, ACP, protein and bilirubin were significantly higher in animals which received paracetamol alone than the normal control animals (Group I). On the other hand, the groups which received both *Borreria articularis* and paracetamol (Group

III, IV and V), the values of the above biochemical parameters were near normal compare to the Group I animals. Among the Group III, IV and V animals, there was no significant difference between Group I and Group V. From this it is evident that, the Group V animals received an optimum dose of (*i.e.* 3 g/kg) *B. articularis* against hepatotoxicity induced by paracetamol.

TABLE-1
EFFECT OF *Borreria articularis* ON PARACETAMOL INDUCED HEPATOTOXICITY

Groups	Biochemical parameters					
	AST IU/L	ALT IU/L	ALP IU/L	ACP IU/L	Protein mg/dL	Bilirubin mg/dL
I	238.0 ± 4.81	224.0 ± 3.41	73.0 ± 1.92	3.6 ± 0.45	2.8 ± 0.42	4.8 ± 0.18
II	502.0 ± 7.32	512.0 ± 6.32	81.0 ± 3.21	5.5 ± 0.58	8.2 ± 2.27	8.2 ± 0.39
III	229.3 ± 4.01	219.8 ± 2.21	68.2 ± 7.23	2.9 ± 0.41	2.1 ± 0.28	3.7 ± 0.38
IV	232.6 ± 4.51	221.3 ± 5.53	70.1 ± 8.21	3.2 ± 0.54	2.5 ± 0.68	4.1 ± 0.35
V	236.4 ± 4.13	223.1 ± 6.52	71.6 ± 7.14	3.3 ± 0.99	2.6 ± 0.69	4.5 ± 0.47

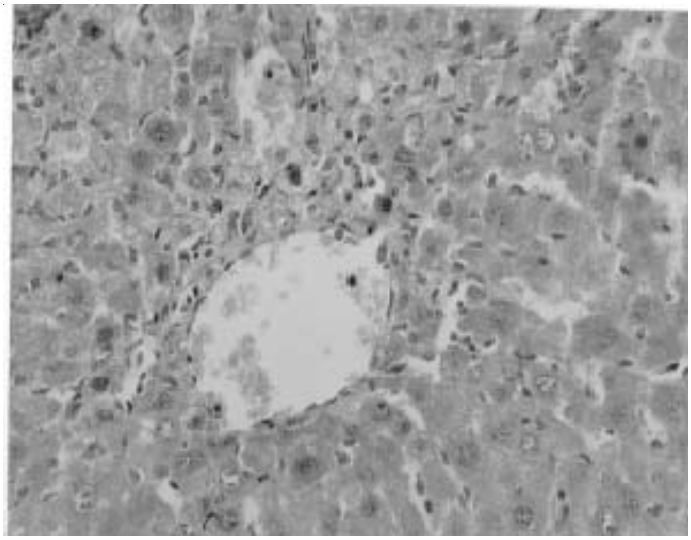

Fig. 1. Photomicrographs of liver section of Group II animals.
(After administration of paracetamol only)

It is well documented that over dosing of paracetamol to rats leads to liver damage[14]. Administration of *B. articularis* significantly protect liver from the toxicity due the paracetamol.

Histopathological studies revealed centrizonal and focal necrosis and ballooning in livers of rats challenged with paracetamol (Fig. 1). But only very mild ballooning was observed (Figs. 2 and 3) in Group III and IV,

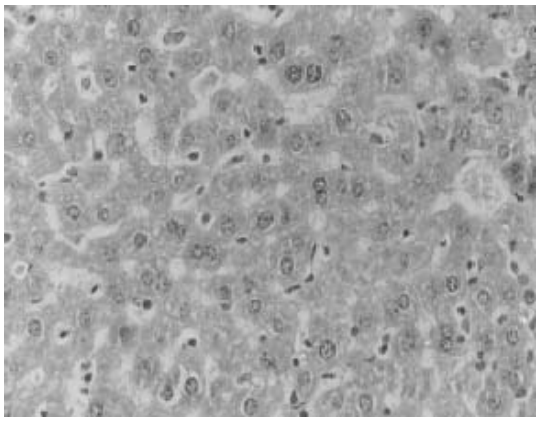

Fig. 2. Photomicrographs of liver section of Group III animals

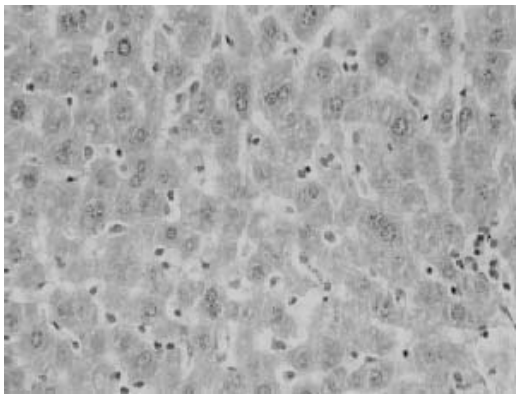

Fig. 3. Photomicrographs of liver section of Group IV animals

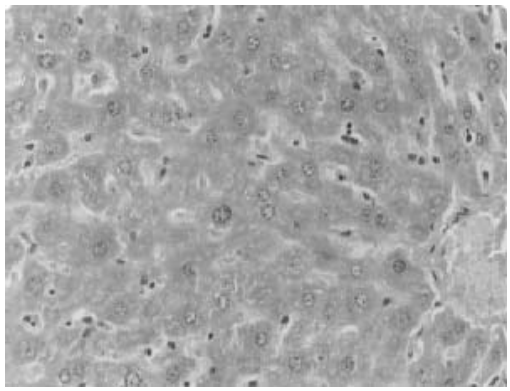

Fig. 4. Photomicrographs of liver section of Group V animals. (Normal liver after administration of paracetamol and *Borreria articularis*)

treated with *Borreria articularis* (1 g/kg and 2 g/kg per day). The livers treated with *Borreria articularis* (3 g/kg per day) appeared to be normal (Fig. 4)

Conclusion

Management of liver disorders is still a challenge to the moderate medicine. Lack of reliable allopathic liver protective drugs, herbal drugs is only alternative for the effective and safe therapy in hepatic ailments.

The purpose of this study is to explore whether the *Borreria articularis* extracts could prevent the hepatic damage caused by paracetamol induced toxicity. The observations obtained from the biochemical and histopathological studies, *B. articularis* is found to be more effective hepatoprotective agent aginst paracetamol induced liver damage in rats.

ACKNOWLEDGEMENT

The authors thank Dr. V. Divaharan, Secretary, Sengamala Thayaar Educational Trust Women's College, Mannargudi. for providing adequate facilities.

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(*Received*: 22 May 2006; *Accepted*: 30 January 2007) AJC-5343