Asian Journal of Chemistry Vol. 21, No. 9 (2009), 7416-7418

NOTE

Hepatoprotective Activity of Stem Heart Wood of *Spondias pinnata*

B. GANGA RAO* and N. JAYA RAJU
Pharmacognosy and Phytochemistry Division, University College of Pharmaceutical Sciences, Andhra University, Visakhapatnam-530 003, India
E-mail: raju8859@rediffmail.com

Spondias pinnata (Anacardiaceae) stem heart wood was prepared and tested for its hepatoprotective effect against carbon tetrachloride induced in rats. Alteration in the levels of biochemical markers of hepatic damage like SGPT, SGOT, ALP, bilirubin were tested in both treated and untreated groups. Carbon tetrachloride has enhanced the SGPT, SGOT, ALP and bilirubin levels. Treatment with ethyl acetate extract of *S. pinnata* stem heart wood (100, 200 and 400 mg/kg) has brought back the altered levels of biochemical markers to the near normal levels in the dose dependent manner.

Key Words: *Spondias pinnata*, Carbon tetrachloride, Hepatoprotective.

The liver is a vital organ of paramount importance involved in the maintanence of metabolic functions and detoxifica from the exogenous and endogenous challenges, like xenobiotics, drugs, viral infections and chronic alcoholism. Liver damage is always associated with cellular necrosis, increase in lipid peroxidation and depletion in the tissue GSH levels. In addition serum levels of many biochemical markers like SGOT, SGPT, ALP and bilirubin levels are elevated[1,2].

However there are several herbs/herbal formulations claimed to possess beneficial activity in treating hepatic disorders. In one of our field surveys we found that a widely grown plant *S. pinnata* which was claimed to possess hepatoprotective property. It was found that this plant contains sterols, flavonoids and gums[3]. There are reports which showed that fruits are astringent and antiscorbutic, also used in bilious dyspepsia. Bark astringent and refrigerant, used in diarrhea and dysentery; a paste of it applied in rheumatism. Roots employed for regulating menstruation[4]. However, there are no significant basis or reports in the modern literature regarding its usefulness as hepatoprotective agent. Thus the present study was conducted to evaluate the hepatoprotective activity of the ethyl acetate extract of the *S. pinnata* stem heart wood by using CCl_4 induced hepatic injury in rats.

Spondias pinnata (Anacardiaceae) stem heart wood were collected from the Salur, Vizianagaram district area, India in the month of December 2007 and authenticated by the taxonomist, Department of Botany, Andhra University and the specimen voucher no AUCP/BGR/2007/A56 was preserved in the Department.

Hepatoprotective studies: Adult albino wistar male rats weighing between 150-200 g were used for the study (supplied by B.N.Gosh and Co., Calcutta). The animals were divided into six groups of six animals each. The experimental protocol has been approved by the institutional animal ethics committee and by the Animal Regulatory Body of the Government (Reg.No:516/01/A/CPCSEA). Sodium carboxy methyl cellulose (0.5 %) in distilled water was used as vehicle (0.1 mL/100 g)[5] through oral route.

The rats were divided into six groups of six animals each. Group-1 served as control which received only vehicle (1 mL/kg, P.O) daily for 5 days and received olive oil (1 mL/kg, P.O) on days 2 and 3. Group-2 served as carbon tetrachloride as control and received distilled water (1 mL/kg, P.O) daily for 5 days. Group-3 was treated with reference drug silymarin (50 mg/kg, P.O) daily for 5 days. Group 4-6 were treated with the ethyl acetate extract of *Spondias pinnata* at doses 100, 200 and 400 mg/kg P.O, respectively for 5 d. Group 2-6 received CCl_4: olive oil (1:1-2 mL/kg) subcutaneous on days 2 and 3 and 0.5 h after administration of extract. The blood samples were allowed to coagulate at room temperature for 1 h. Serum was separated by centrifugation at 12,000 rpm at 40 for 5 min[6].

Biochemical studies: Serum was analyzed for various biochemical parameters, *i.e.* serum glutamyl oxalacetic acid transaminase (SGOT, AST), serum glutamyl pyruvate transaminase (SGPT, ALT)[7], alkaline phosphastase (ALKP)[8] and for serum bilirubin[9].

TABLE-1
EFFECT OF ETHYL ACETATE EXTRACTS OF S. *pinnata* ON CCl_4 INDUCED HEPATOTOXICITY IN MALE RATS

Groups	SGOT (IU/mL)	SGPT (IU/mL)	SALKP (IU/mL)	Total bilirubin (g/dl)
1. Control 1 mL/kg	160.5±0.62	96.95±1.34	179.5±0.99	0.82±0.06
2. CCl_4 1 mL/kg	295.5±0.39^{+}	269.50±1.8^{+}	296.5±1.45^{+}	2.02±0.03^{+}
3. Silymarin 50 mg/kg	174.8±1.88***	107.50±1.45***	187.7±2.02***	0.89±0.04***
4. S. P 100 mg/kg	241.3±2.84*	200.83±0.60*	206.5±3.40*	1.34±2.42*
5. S. P 200 mg/kg	228.2±7.40**	184.23±2.84**	197.5±1.91***	1.27±1.27**
6. S. P 400 mg/kg	188.9±2.35***	131.03±1.38***	195.4±3.05***	1.06±1.43***

Values are mean ± sem for six observations.
P: $^{+}$< 0.001 Compared to respective control group-1.
P: *< 0.05, **< 0.01, ***< 0.001 Compared to respective control CCl_4 in group-2.

Results indicated that the ethyl acetate extract of stem heart wood of *S. pinnata* provides protection against the toxic effect of CCl_4 on liver. In CCl_4 induced toxic hepatitis, toxicity begins with the changes in endoplasmic reticulum, which results in the loss of metabolic enzymes located in the intracellular structures[10]. The blood samples of group-2 animals showed drastic increase in the levels of SGPT, SGOT, SALKP and bilirubin levels reported in Table-1.

Administration of ethyl acetate extract of stem heart wood of *S. pinnata* showed recovery against the toxic effects of CCl_4 as shown in Table-1. The results of this investigation indicated that the ethyl acetate extract of stem heart wood of *S. pinnata* possess hepatoprotective activity against CCl_4 induced liver damage in rats.

ACKNOWLEDGEMENTS

The authors are thankful to taxonomist Prof. M. Venkiah, Department of Botany, Andhra University, Visakhapatnam for plant identification and authentication and also Prof. T. Satyanarayana, Department of Pharmacognosy, Andhra University for helping to carry out the study.

REFERENCES

1. J.S. Mossa, M. Tariq, A. Mohsin, A.M. Aqueel, M.A. Al-Yahya, M.S. Al-Said and S. Rafatullah, *Am. J. Chin. Med.*, **19**, 223 (1991).
2. N. Mascolo, R. Sharma, S.C. Jain and F. Capasso, *J. Ethanopharmacol.*, **22**, 211 (1998).
3. S. Tandon and R.P. Rastogi, *Planta Med.*, **29**, 190 (1976).
4. The Useful Plants of India-National Institute of Science Communication, CSIR, p. 595 (2000).
5. G.K. Dash, A. Samanta, S.K. Kanugo, S.K. Sahu, P. Suresh and S. Ganapathy, *Indian J. Nat. Prod.*, **16**, 25 (2000).
6. R.L. Khosa, P. Padma and P.N. Chansouri, *Ancient Sci. Life*, **19**, 7 (1998).
7. S. Reitman and A.S. Frankel, *Am. J. Clin. Pathol.*, **28**, 56 (1957).
8. P.R.N. Kind and E.J. King, *J. Clin. Pathol.*, **7**, 322 (1954).
9. H.T. Malloy and K.A. Evelyn, *J. Biol. Chem.*, **119**, 481 (1937).
10. R.O. Reonagel, *Trends Pharmacol. Sci.*, **4**, 129 (1983).

(*Received*: 4 August 2008; *Accepted*: 25 August 2009) AJC-7783