

Short communication

Hepatoprotective activity of *Luffa echinata* fruits

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Abstract

The different extracts of the fruits of *Luffa echinata* Roxb. (Cucurbitaceae) were tested for their hepatoprotective activity against CCl₄ induced hepatotoxicity in albino rats. The degree of protection was measured by using biochemical parameters like serum glutamic oxalacetic transaminase (SGOT), serum glutamic pyruvate transaminase (SGPT), alkaline phosphatase (ALKP), total protein (TP) and total albumin (TA). The petroleum ether, acetone and methanolic extracts showed a significant hepatoprotective activity comparable with those of Silymarin. © 2001 Elsevier Science Ireland Ltd. All rights reserved.

Keywords: *Luffa echinata*; Hepatoprotective activity; Silymarin

1. Introduction

About 600 commercial preparations with claimed liver protecting activity are available all over the world. About 100 Indian medicinal plants belonging to 40 families are used for herbal formulation (Handa et al., 1986). A few reports on the hepatoprotective activity are cited here, e.g. *Apium graveolens* Linn. (Umbelliferae) (Handa and Singh, 1995), *Boerhaavia diffusa* Linn. (Nyctaginaceae) (Chakarborti and Handa, 1989), *Euphorbia antisyphilitica* (Euphorbiaceae) (Saraf et al., 1996), *Rubia cordifolia* (Rubiaceae) (Sharma et al., 1996), *Solanum lyratum* (Solanaceae) (Yang et al., 1996).

Luffa echinata (Roxb), popularly known, as 'Bindal' in Hindi is a slender herb belonging to the Cucurbitaceae which grows widely in India (Kirtikar and Basu, 1933). Practitioners of the indigenous system of medicine, affirm to obtain beneficial results with the fruits of their plant in the treatment of liver ailments (Nadkarni and Nadkarni, 1954; Chopra et al., 1956). *L. echinata* is reported to contain: Echinatin, Saponins (Bhatt and Khurana, 1957), Hentriacontane, Gypso-

genin (Khorana and Raisinghani, 1961), Amariin (Chaudhary et al., 1951) Cucurbitacin-B & -E, Saponin, β -Sitosterol, Echinatol-A & -B, Oleanolic acid (Bhakuni et al., 1961a,b,c), Elaterin-2-O- β -D-Glucopyranoside, Isocucu & bitacin-B, Elaterin glucoside, Chrysoeriol-7-glucoside, Graviobioside-B, Sitosterol glucoside (Seshadri and Vydeeswaran, 1971), Datis-cacin, 2-O- β -D-glucopyranosyl cucurbitacin-B & 2-O- β -D-glucopyranosyl cucurbitacin-S (Mesbah et al., 1994). In the present work, the liver protective effects of the different extracts of *L. echinata* fruit against CCl₄ induced hepatotoxicity in rats has been studied. The degree of protection was measured by using biochemical parameters like serum glutamic oxalacetic transaminase (SGOT), serum glutamic pyruvate transaminase (SGPT), alkaline phosphatase (ALKP), total protein (TP) and total albumin (TA).

2. Material and methods

2.1. Plant material

The fruits of *L. echinata* were procured from the Herba Indica, Chandigarh, India, and collected in the month of May 1998 and authenticated by a taxonomist Dr H.S. Puri, the Director of Herba Indica. The

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voucher specimen (No. 525) of the fruits has been kept in the herbarium of Jamia Hamdard for future reference.

2.2. Preparation of plant extracts

The plant material (8.0 kg) was dried and crushed to powder and then successively extracted to exhaustion with petroleum ether (60–80°C), acetone and methanol using cold percolation method. The different extracts thus obtained were dried under reduced pressure to get the crude extract (200 g), (650 g) and (150 g) respectively.

2.3. Experimental animals

The study was carried out on Wistar albino rats (150–200 g) of either sex as reported in the literature (Handa and Singh, 1995). The rats were bred in colony in the Central Animal House of Jamia Hamdard. They were fed with a standard pellet diet (Gold Mohar, Lipton India, Calcutta) and water ad libitum. Before their use in the experiment the rats were kept in standard environmental conditions, (temperature 25–28°C and 12 h light/dark cycle). Five animals in each group were used in all sets of experiments.

2.4. Hepatoprotective activity testing

Animals were divided into six groups of five rats in each for all the experiment. The first group served as vehicle control and received normal saline only. The second group served as carbon tetra chloride (CCl₄) intoxicated control and received by gavage vehicle (normal saline) and CCl₄ diluted with liquid paraffin (1:1). Third group was given standard drug Silymarin at the dose of 10 mg/kg body weight and the remaining

groups were given different extracts at the dose of 250 mg/kg body weight and CCl₄. The vehicle (1% gum acacia in distilled water) or test drugs were administered orally for 6 days. CCl₄ diluted with liquid paraffin (1:1) was administered in a dose of 1 ml/kg subcutaneously (s.c). Twenty four hours after CCl₄ administration, blood was obtained from all groups of rats by puncturing retro-orbital plexus. The blood samples were allowed to clot for 45 min at room temperature. Serum was separated by centrifugation at 2500 rpm at 30°C for 15 min and analyzed for various biochemical parameters.

2.5. Assessment of liver function

Biochemical parameters: SGOT, SGPT, (Reitman and Frankel, 1957), ALKP (Kind and King, 1954), TP and TA (Wooton, 1964) were analyzed according to the reported methods.

2.6. Statistical analysis

Results of the biochemical estimations are reported as mean \pm S.E. Total variation, present in a set of data was estimated by one way analysis of variance (ANOVA), Student's t-test and Dunnett's test were used for determining significance (Woolson, 1987; Dunnett's 1964).

3. Results and discussion

As shown in Table 1, activities of serum GOT, GPT alkaline phosphatase and albumin were markedly elevated while total protein level was decreased in CCl₄ treated animals comparable to normal control rats. Administration of different extracts of *L. echinata*

Table 1
Effect of various extracts of *Luffa echinata* fruits on Serum enzymes, alkaline phosphatase total proteins and albumin in CCl₄ induced liver damage in rats^a

Treatment	Dose	SGOT	SGPT	ALKP	TP	TA
Control	—	29.2 \pm 1.35	68.0 \pm 2.50	29.08 \pm 0.8	5.71 \pm 0.17	3.61 \pm 0.12
CCl ₄	1 ml/kg (s.c)	72 \pm 25	95.6 \pm 7.26	51.99 \pm 2.34	4.97 \pm 0.09	4.34 \pm 0.09
Silymarin	10 mg/kg (p.o.)	56.4 \pm 5.66	47.6 \pm 3.12*	22.16 \pm 2.38*	7.67 \pm 0.29***	3.27 \pm 0.12***
Petroleum ether extract	250 mg/kg (p.o.)	27.6 \pm 1.94**	30.8 \pm 2.93*	36.0 \pm 2.45*	6.55 \pm 0.11***	3.69 \pm 0.10***
Acetone extract	250 mg/kg (p.o.)	45.6 \pm 5.22	35.2 \pm 2.05*	30.0 \pm 0.00*	5.90 \pm 0.88**	4.17 \pm 0.00
Methanol extract	250 mg/kg (p.o.)	38.4 \pm 4.12*	48.4 \pm 1.83*	29.53 \pm 1.38*	6.54 \pm 0.18***	3.92 \pm 0.11**

^a SGOT, serum glutamyl oxaloacetate transaminase; SGPT, serum glutamyl pyruvate transaminase; ALKP, alkaline phosphatase; TP, total protein; TA, total albumin; s.c., subcutaneous; p.o., per oral.

*** $P < 0.001$;

** $P < 0.01$;

* $P < 0.05$ vs. CCl₄; Values are mean \pm S.E. of five animals. One way analysis and Dunnett's test.

(fruits) at dose of 250 mg/kg markedly prevented CCl_4 induced elevation of serum GOT, GPT, ALKP and TA and diminution of TP.

The petroleum, acetone and methanolic extracts decreased SGOT by 27.6, 45.6, 38.4%, while SGPT by 30.8, 35.2, 48.4% and ALKP by 36.0, 30.0 and 29.53%, respectively, which indicated that acetone extract was most active in case of SGOT, methanolic extract in case of SGPT and petroleum extract in case of ALKP. On the other hand, the percentage of TP was increased and TA was decreased by all extracts in different proportions.

It has been, therefore, found that the different extracts of *L. echinata* have varied degrees of antihepatotoxic activity. Since extracts of *L. echinata* do not produce any gross behavioral changes or mortality even at a dose of 250 mg/kg, p.o. in rats as also reported in the literature (Bapat and Chandra, 1968).

4. Conclusion

The above observations have shown that the different extracts of the fruits of *L. echinata* contain some active principles (Triterpenes, Bhatt and Khurana, 1957), which may be responsible for producing their characteristic effect on hepatotoxicity. The isolation and testing of constituents likely to be responsible for the hepatoprotective activity of *L. echinata* is in progress in the laboratory.

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