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Gastroprotective activity of crude extract of *Jania* sp (red algae) on ethanol-induced gastric lesions in rats

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Introduction: Marine-derived bioactive compounds have begun to make significant contributions to biomedicine, and are likely to continue to do so in future [1]. In this respect, we have initiated a programme of research aimed at isolating and characterising biomedically important secondary metabolites from marine organisms (soft corals, red algae and sponges) found in the coastal waters of Sri Lanka.

So far, we have reported anti-fertility [2] and spermatostatic activity [3, 4] in extracts prepared from alcyonacean soft corals. In this paper we report gastroprotective activity in a methanol-dichloromethane (1:1) extract of red algae, *Jania* sp. against ethanol-induced gastric lesions in rats.

Materials and methods: The specimens of red algae, *Jania* sp. (Family corallinaceae), were collected at Beruwala on the southern coast of Sri Lanka at a depth of 0.5–1.0 m in July, 1988. This alga is a thallus, a highly segmented, dichotamously branched, long (2.0–3.0 cm) needle-like form arising from a small basal disc that grows epiphytically on sea grasses found in the intertidal zone. A voucher specimen is on deposit at the Museum of the Department of Zoology, University of Colombo, Sri Lanka (Registration No. R.A. 05).

The specimens (4.5 kg) were immersed in a methanol-dichloromethane (Petroleum Corporation, Colombo, Sri Lanka) (1:1, 7.5 L) solvent system and then stored at 30 ± 1°C for 14 days. The solvents were decanted off and concentrated *in vacuo* at 30 ± 1°C to obtain the crude extract (yield 5.0 g kg^{-1}). Traces of organic solvents were removed by storing the crude extract under vacuum overnight at 30 ± 1°C. The crude extract was suspended in 1% methyl cellulose (low substitution, BDH Chemicals Ltd., Poole, UK) in the ratio of 125 mg extract : 1 mL, 1% methyl cellulose and stored at 5°C.

Male cross bred albino rats (225 – 250 g) from our own colony were used. They were kept in raised wide mesh bottom cages to prevent coprophagy. Food was withheld for 24 h and tap water for 1 h before the commencement of the experiment. These animals were randomly divided into six groups (5 – 7 animals per group). Group 1 ($N = 7$) received 1 mL of 1% methyl cellulose orally and group 2 ($N = 5$) the same intraperitonially. Rats in group 3 ($N = 6$) and group 4 ($N = 5$) were administered with 1 mL of the extract orally and intraperitonially respectively.

Animals in groups 5 ($N = 6$) and 6 ($N = 6$) were pretreated (orally) with 10 mg kg^{-1} of indomethacin (Sigma) 1 h before they were treated with 1 mL of methyl cellulose (orally) and 1 mL of extract (orally) respectively. The rats in all these groups were then given (orally) 1 mL of absolute ethanol [5, 6] 30 min following the administration of the extract or vehicle. One hour after this ethanol treatment the rats were killed by an overdose of ether (BDH Chemicals Ltd., Poole, UK) and their stomachs were excised and opened along the greater curvature.

The mucous content along the gastric mucosa was then noted. The length of the linear, haemmorhagic lesions induced by ethanol treatment was measured for each stomach using a vernier caliper fixed with two pointed fine pins at the arms. These measurements were summed up and was divided by the number of animals which received a specific treatment.

The results are given as means ± SEM. Data were analysed by ANOVA and comparisons between control and test groups were made using Duncan's new multiple range test. p values less than 0.05 were regarded as significant.

Results: Data obtained are summerised in Tables 1 and 2. Oral administration of 1 mL ethanol induced multiple elongated 72 dark red haemmorhagic lesions (group 1, 2 and 5). As reported by others [5–7] these lesions were confined to the corpus and was aligned along the greater curvature of stomach. In between the lesions erythematous discolouration was usually evident. The extract at a dose of 500 mg kg^{-1} when administered either orally (group 3) or intraperitonially (group 4) reduced the mean length of the ethanol induced lesions by 82% (Table 1). This gastroprotective effect was significant ($p < 0.01$).

Furthermore, on visual examination, no marked increase in mucous content in the stomachs was apparent in the extract-administered animals compared to the controls. The effectiveness of the algal extract (Table 2) against ethanol-induced gastric lesions was not significantly affected (group 6) by pre-treatment with indomethacin (10 mg kg^{-1}). This dose is known to abolish endogenous prostaglandin production in the gastric mucosa of rat [5, 6, 8].

Table 1: Effect of (500 mg kg^{-1}) extract of Jania *sp on ethanol-induced gastric lesions in rats (means ± SEM).*

Treatment Route of administration	*n*	Gastric lesion length (mm)
Oral		
Methyl cellulose	7	85.85 ± 7.73
Extract	6	14.66 ± 6.23**
Intraperitonial		
Methyl cellulose	5	125.60 ± 13.57
Extract	5	21.40 ± 17.67**

** *As compared to control treatment* $p < 0.01$.

Table 2: Effect of pre-treatment with indomethacin (10 mg kg^{-1}) on the action of the extract of Jania *sp (500 mg kg^{-1}) on ethanol-induced gastric lesions in rats (means ± SEM).*

Treatment Route of administration	*n*	Gastric lesion length (mm)
Oral		
Methyl cellulose	6	89.66 ± 15.24
Extract	6	10.66 ± 7.06**

** *As compared to control treatment* $p < 0.01$.