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Antiulcerogenic Effects of Unripe Fruits of *Ficus racemosa* Linn.

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The anti-ulcerogenic effect of unripe fruits of *Ficus racemosa* Linn was examined in gastric ulcer models induced by ethanol, 4 h pylorus ligation. 50 % Ethanolic extract of *Ficus racemosa* at the doses of 100 mg/kg (55.82 %, $p < 0.01$), 200 mg/kg (74.23 %, $p < 0.01$) and 300 mg/kg (87.73 %, $p < 0.001$) and sucralfate (Standard drug) at a dose of 250 mg/kg (84.66 %, $p < 0.001$) were given orally for 5 d. Unripe fruits of *F. racemosa* produced significant antiulcer activity in all the experimental gastric ulcer models.

Key Words: Antiulcer, *Ficus racemosa*, Pylorus ligation.

INTRODUCTION

Ficus racemosa Linn (Moraceae) is commonly used in treatment of skeletal fracture in Srilanka. Methanolic extract of stem bark of *F. racemosa* is used as antipyretic[1] and antitussive[2]. Petroleum ether extract of leaf of this plant is used as antiinflammatory[3] and antibacterial[4] while its leaves used as hepatoprotective[5].

The present study was undertaken to evaluate the unripe fruits of *Ficus racemosa* on experimental gastric ulceration and gastric changes in rats. Sucralfate, a non-absorbable aluminium salt of sucrose octasulfate, served as reference compound. The drug sucralfate is also clinically effective in preventing stress ulceration in critically ill patients. Sucralfate is reported to be clinically effective in healing of gastric ulcer and peptic ulcer recurrence[6].

EXPERIMENTAL

Animals: Sprague-Dawely rats (150-180 g) and albino mice (15-18 g), procured from M/s Venkateshwara Enterprises and were used for the study. They were kept in the departmental animal house at 26 ± 2 ºC. The animals were provided with standard rodent pellet diet (Amrut, India) and the food was withdrawn 18 h before the experiment though water was allowed *ad libitum*.

Acute toxicity studies: The adult male albino mice were selected for acute toxicity study. The ethanolic extract of unripe fruits of *Ficus racemosa* Linn was taken at various doses levels (1000, 2000 and 3000 mg/kg body wt) dissolved in 1 % CMC and administered to the animals orally 10 mL/kg. The animals were observed continuously for 2 h and then occasionally for further 4 h and finally for any mortality. Behaviour of the animal and any toxic symptoms also were observed for 72 h and up to 14 d.

Antiulcer study: The animals were divided into six groups of six animals in each. First group received suspension of 1 % CMC in distilled water 10 mL/kg (normal control), second group (ulcer control) received food and water, third group received 50 % ethanolic extract (100 mg/kg, p.o.), fourth group received (200 mg/kg), fifth group received (300 mg/kg, p.o) of *F. racemosa* and sixth group received sucralfate (250 mg/kg p.o) in ulcer rats, respectively. Gastric ulcers were produced in rats by Sanyal *et al.*[7]. Drugs were administered orally twice daily at 10:00 and 16:00 h, respectively for 5 d before gastric ulcers were induced. The drug samples were prepared in 1 % CMC. The following experimental models were used.

Pylorus-ligated (PL) induced ulcers: The rats were fasted for 24 h before pylorus-ligation but water was allowed *ad libitum*. At the end of 24 h starvation, rats were anaesthetized with pentobarbitone sodium (35 mg/kg, i.p.). The abdomen was opened by a midline incision and a ligature was placed at the pyloric end of the stomach, without causing any damage to its blood supply. The abdomen was then closed in two layer and rats were left in a cage with a false bottom of wide mesh wire gauze to prevent coprophagy. The animals were deprived of water during 4 h, stomach was dissected out and contents were collected into tubes for estimation of biochemical parameters. The ulcers were scored as described according to the method of Sanyal *et al.*[7].

Ethanol-induced ulcers: The gastric ulcer was induced in rats by administering ethanol. Ethanol was administered on the day of the experiment and the animals were sacrificed by cervical dislocation and stomach was incised along with greater curvature and examined for ulcers. The ulcer index was screened by a person unaware of the experimental protocol, based upon the product of length and width of the ulcers present in the glandular portion of the stomach and the data was done by using unpaired students-test.

Statistical evaluation: Data are expressed as mean ± SEM (standard error of mean) for 8 rats. The difference among means has been analyzed by unpaired student's t-test[8].

RESULTS AND DISCUSSION

Antiulcer study: A dose-response antiulcer study was done using 100, 200 and 300 mg/kg b.w of ethanol extract of unripe fruits of *Ficus racemosa* Linn against various validated gastric ulcer models like pylorus ligation and ethanol-induced ulcers. The ethanol extract was administered to various groups, orally, twice daily for 5 d and the experiments were carried out on 18-24 h fasted rats on 6th day. Ulcer were scored and analyzed as described earlier. The result indicated a dose-dependent antiulcerogenic activity in ethanol extract of unripe fruits of *Ficus racemosa* Linn (Tables 1 and 2). The optimal effect observed was at the dose of 300 mg/kg onwards with *Ficus racemosa* Linn. Therefore, for further subsequent studies on other parameters of gastric secretion or mucosal studies, a dose of 400 mg/kg was selected.

TABLE-1
EFFECT OF 50 % ETHANOLIC EXTRACT OF *Ficus racemosa* LINN. (TWICE DAILY FOR 5 d) ON PYLORUS LIGATION-INDUCED GASTRIC ULCERS

Group	Treatment	Dose (mg/kg)	Ulcer index (mm^2/rat)	Percent protection
I	Pylorus ligation	–	16.3 ± 2.8	–
II	*F. racemosa* L extract	100	7.2 ± 2.2[a]	55.82
III	*F. racemosa* L extract	200	4.2 ± 2.0[a]	74.23
IV	*F. racemosa* L extract	300	2.0 ± 1.6[b]	87.73
V	Sucralfate	250	2.5 ± 1.2[b]	84.66

Values are mean ± SEM for 6 rats.
[a]$p < 0.01$ compared to respective pylorus ligated group.
[b]$p < 0.001$ compared to respective pylorus ligated group.

TABLE-2
EFFECT OF 50 % ETHANOLIC EXTRACT OF *Ficus racemosa* LINN. (TWICE DAILY FOR 5 d) ON ETHANOL-INDUCED GASTRIC ULCERS

Group	Treatment	Dose (mg/kg)	Ulcer index (mm^2/rat)	Percent protection
I	–	–	16.6 ± 3.9	–
II	*F. racemosa* L extract	100	9.7 ± 2.8	41.56
III	*F. racemosa* L extract	200	6.3 ± 2.4[a]	62.04
IV	*F. racemosa* L extract	300	3.2 ± 1.6[b]	80.72
V	Sucralfate	250	3.4 ± 1.7[b]	79.51

Values are mean ± SEM for 6 rats.
[a]$p < 0.05$ compared to respective EtOH group.
[b]$p < 0.01$ compared to respective EtOH group.

The aim of the present study was to assess the role of various mucosal offensive acid-pepsin and defensive mucosal factors. Attempts were made on the necessity of non-toxic, antiulcer compounds preferably from traditional medicinal plants such as fruits of *Ficus racemosa* Linn for their protection against various experimental gastric ulcer models. Attempts were then further made to find out the status of the offensive acid-pepsin and defensive mucosal factors like mucin secretion, mucosal glycoproteins and antioxidant activities in herbal drugs.

Pylorus-ligated ulcers may be due auto digestion of gastric juice, decrease mucosal blood flow and break down of mucosal barrier. It utilizes neither exogenous ulcerogens nor is induced by exogenous interfering factors. Ulcers are believed to develop because there is an excess of acid and pepsin for a given degree of mucosal defense.

Ficus racemosa Linn were found to possess ulcer protective effects dose-dependently against Pylorus-ligation and ethanol-induced gastric models ulcer in rats.

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