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Analysis of the Effects of Ethanol Extract of Emilia Coccinea on Induced Gastric Ulcer in Rats

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Abstract **– This paper presents the antiulcer activities of the ethanol extract of Emilia Coccinea leaves on indomethacin and ethanol – induced gastric ulcers were evaluated. Twenty Adult Whistler rats of either sex were divided to five groups (5 rats/group). The results obtained show that the ulceration in gastric linings of the stomach of rats pre-treated with Emilia Coccinea leaves extract before induction with ethanol and indomethacin decreased significantly when compared to the control. The preventive effect of the extract increased in a dose-dependent manner in both ulcer models. We observed a significant decreases ($p < 0.05$) in the number of ulcer lesions when rats were administered with graded doses of the extract and ranitidine (100mg/kg body weights) compared with the control groups in both models. The results from the study reveals that the extract of Emilia Coccinea leaves has potential efficacy of protecting the stomach, linings against ulceration induced by both indomethacin and ethanol in rats.**

Keywords **– Emila Coccinea, Ranitidine, Indomethacin, Ethanol and Ulcer Lesions.**

I. INTRODUCTION

Emilia Coccinea is a member of Umbelliferae family which grows near farm lands and is consumed as vegetable in some region in the west of Iran. Over the decades, researchers have been exploring the biodiversity of the plant kingdom to find new and better drug that could cure many diseases that are afflicting human population (Abdul et al 2009), Jaimu and Devis, 2003). Photochemical studies showed the presence of tannin and saponin and no falvonoids or terpeniod (Fazly et al. 1993). It also contains essence, vitamin C, phaytoestrol, protein and starch (Azhdari, 2000, Mar-Haidar, 2001).

Ulcerative lesions of gastrointestinal tract are one of the major side effects associated with alcohol consumption (Mizui et al. 1987). Gastric ulcer is a benign lesion occurring at a site where the mucosal epithelium is exposed to acid, alcohol and pepsin. There are many products used for the treatment of gastric ulcers, including Aspirin (pain killer), H2-blockers, Ml-blockers, proton pump inhibitors which decreased secretion of acid and sucralfate and carbenoxolone which provide mucosal defense. Although these drugs have brought about remarkable changes in ulcer therapy, their efficacy is still debatable. Report on clinical evaluation of these drugs show that there are incidences of adverse effects and drug interactions during ulcer therapy (Goel and Sairam, 2002). Thus, there is a need for more effective and less toxic antiulcer agents. Plant extracts are some of the most attractive sources of new drugs and have been shown to produce promising results for the treatment of gastric ulcer (Alkofahai and Atta, 1999).

We have observed from the literature that there are no scientific reports that support the traditional claims of Emilia Coccinea. The present study is therefore an attempt to assess the efficacy of this indigenous herb for its gastro protective effect in rats.

II. MATERIALS AND METHODS

Plant Material

Emilia Cocconea was identified and authenticated by a botanist (Mr. Agbonogieva, C., Botany Department, University of Benin, Nigeria). The leaves were dried under the sun for two weeks until they were completely dried and then milled to a coarse powder with an electric milling machine.

Preparation of Extract

1.25 kg quantity of the pulverized leaves was obtained and then this stock quantity was macerated with ethanol and allowed to stay for 24 hour after which filtration was done using what man filter paper. The filtrate was concentrated in beakers with the aid of a rotory evaporator and water bath at reduced temperature. After, concentration a crude brownish semi-solid substance weighing 52.6g was obtained. The substance was then preserved in a small container (film container), covered in a water-proof and then kept inside a cupboard at stable room temperature until when needed.

Animals

Adult Whistler rats (100-200g) of either sex were used; the animals were acclimatized in metal cages with raised floors of wide wire mesh to prevent coproiophagy and were housed in an ambient temperature of 25^{oC} for one weak. They were fed a balanced diet and given free access to water. All animals were fasted for 48 hours before use to ensure an empty stomach (Garg et al. 1993). During the fasting period rats received a nutritive solution of 8% sucrose in 0.2% Nacl to avoid excessive dehydration.

Acute Toxicity Test

The intraperitoneal acute toxicity (LD_{50}) of the extract was evaluated in Swiss albino mice as described by Miller and Tainted (1944). In brief the method involved the administration of 5 different does of the extract to 5 groups of mice (6 mice/group). The mortality in each group was recorded within 24 hours. LD_{50} was estimated from the graph of percentage (%) mortality (converted to probit) against log-dose of the extract probit 5 being 50%.

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Experimental Design

Three treatment groups received 50, 100, 150 mg/kg Emilia Coccinea extract orally via syringe needle. Two doses were given at 07.00 and 14.00 and third dose was given on the second day 1.5 hour before induction of gastric ulceration (Alkofahi and Atta, 1999). A negative control group was given distilled water (10 ml/kg) and a positive control group was given Ranitidine at 50 mg/kg. All animals were given ethanol 50% (v/v) (in distilled water) at 10 ml/kg orally to induce gastric ulceration (Alkofahi and Atta, 1999).

Four hours after ethanol administration, all rats were killed by an overdose of chloroform and the stomachs were rapidly removed, opened along the greater curvature. The stomach was rinsed with water, pinned flat on a board, examined with a hand lens (`x10) and scored for ulcer.

Long lesions were counted and measured along their greater length. Petechia lesions were counted. Each five Petechia lesions were taken as 1mm of ulcer (Alkofahi and Atta 1999). The sum of the total length long ulcers and petechial lesions in each group of rats was divided by its number to calculate the ulcer index (mm).

III. Ulcer Indices (mm)

Individual Ulcer Index (mm)

This can be defined as the total number of ulcerations found in each rat. It is denoted by $N = n_1 + n_2 + n_3 + n_4$

Group Ulcer Index (GUI) (mm)

This is the sum of all individual ulcer indices in a group. It is denoted by $TN = N_1 + N_2 + N_3$ where, N_1, all $n_1$in group, N_2, all $n_2$in the group, N_3, all $n_3$in the group, N_4, all n_4 in the group.

Mean Ulcer Index (MUI) (mm)

This is simply the average of the ulcerations found in a group. It is obtained by dividing the total number of individual ulcerations in a group (GUI) with number of rats in that group.

Percentage Inhibition (PI)

With respect to this study, the percentage inhibition can be calculated using the formula.

$$\% \text{ ulcer inhibition (\% UI)} = \frac{\text{(I-ut)}}{\text{Uc}} \times 100$$

Where, Ut represents the ulcer index of the treated group and Uc represents the ulcer index of the control group.

IV. Results

Protective effect of the extract on indomethacin-induced gastric ulcer in rats

The results presented in Table 1 indicate that pretreatments with test extracts reduced the ulceration markedly. The percentage inhibition of ulceration by the text extracts were 70.15, 82.00 and 83.10% at 50, 100 and 150 mg/kg doses, respectively which is compared to that of standard anti-ulcer drug ranitidine (50 mg/kg) as shown in Table1.

Table 1. The protective effect on the extract on indomethacin-induced ulcer

	Group	*No of rats*	*Mean Ulcer index (MUI) (mm)*	*Percentage inhibition %*
i.	*(Normal control)*	*4*	*2.50 ± 0.5439*	*-*
ii.	*(50mg/kg)*	*4*	*0.75 ± 0.3862*	*70*
iii.	*(100mg/kg)*	*4*	*0.45 ± 0.0577*	*82*
iv.	*(150mg/kg)*	*4*	*0.40 ± 0.0816*	*85*

Results in Table 1 show a significant increase ($p < 0.05$) in the ulceration level of the control group administered with normal saline as compared with the ulceration level groups [3(100 mg/kg,), 4 (150mg/kg) and 5 (ranitidine)]. But there were no significant difference in the ulceration level of group 2 (50 mg/kg) when compared with groups [3(100 mg/kg,) 4 (150mg/kg) and 5 (ranitidine)].

Protective effect on the extract on ethanol induced gastric ulceration in rats.

The results obtained in ethanol induced gastric ulcer as shown were comparable to that obtained in indomethacin-induced ulcer. The extract proved to be more efficient on indomethacin-induced ulcer than in the ethanol-induced ulcer. This was observed in ulcer lesions inside the rat stomach where the dark spot-like lesions induced by indomethacin reduced more readily than the reddish lesions that were induced by ethanol. From Table 2, the percentage (%) inhibition of the ulceration induced by ethanol by the test extracts are 30, 53, and 57% for 50, 100 and 150 mg/kg B.W., respectively in dose dependent manner. Also, from Table 2, the result obtained shows that ulceration in groups 3 (100 mg/kg), 4 (150mg/kg), and 5 (ranitidine) significantly decreased ($P < 0.05$) compared to group 1 (normal control). There was no significant difference ($P < 0.05$) in the level of ulceration in group 2 when compared with group 1 (normal control).

Table 2. The protective effect of the extract on ethanol-induced gastric ulcer in rat.

	Group	*No of rats*	*Mean Ulcer index (MUI) (mm)*	*Percentage inhibition %*
i	*(Normal control)*	*3*	*2.86 ± 2.76666*	*-*
ii	*(50mg/kg)*	*3*	*2.33 ± 2.33333*	*30*
iii	*(100mg/kg)*	*3*	*1.33 ± 1.33333*	*53*
iv	*(150mg/kg)*	*3*	*1.20 ± 1.20000*	*57*
v	*(Ranitidine)*	*3*	*1.23 ± 1.3333*	*60*

V. DISCUSSION

The finding of present study demonstrated that, ethanol extract of Emilia Coccinea significantly protected against Mucosal damage, induced by ethanol and curative ratios of plant extracts 50, 100, and 150 mg/kg were 70.15, 82.00 and 83.10 respectively. It is remarkable that, these doses produced a greater protection than ranitidine (50 mg/kg) against the ethanol. Narcotizing agent such as ethanol, when given intragastrically to rats produce server gastric hemorrhagic erosion. Ethanol induced both long ulcers and petechial lesions within a short time, which makes this technique suitable for screening experiments for investigation of antiulcer drugs.

The present research has provided firsthand information on acute toxicity and the protective effects of the plant extract on indomethacin and ethanol-induced gastric ulceration in rats. The acute toxicity study revealed that the plant is relatively not toxic to the experimental animals and could be used in medical treatments. The results from Table 1 show that indomethacin (50 mg/kg) that induced ulcer in the stomach of the rats was qualitively antagonized in a dose-dependent fashion as observed in groups 2, 3 and 5 that were administered with 50, 100 and 150 mg/kg body weight of the extract respectively.

Also, the results show that the ulceration rate was significantly higher ($P< 0.05$) in the group administered with normal saline (control) compared with the positive control group and test groups. This indicates that the level of ulceration in negative control group is high due to the absence of antiulcer genic agents and this agrees with the findings of Kabe and Kutimu (1994), who observed the same effect on the negative control group. Also, from Table 2 the level of ulceration induced by ethanol was also antagonized dose dependently by the extracts but the level of inhibition was higher in indomethacin induced ulceration compared to that of ethanol induced ulcer, though both are comparable.

In conclusion, to our knowledge, this study provides for the first time evidence that showed gastro protective effect of Emilia Coccinea against ethanol induced ulcers which correlated with the folk medicinal use of this herb in the west of Iran.

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