Research Article

Screening of Gastric Antiulcer Activity of *Sida cordifolia*

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ABSTRACT

Ulcers were introduced in 36 hrs fasted albino rats of either sex by aspirin plus pylorus ligation, aspirin, and ethanol treatment. Each induction model had four groups namely control, test and standard. In each model of ulcer induction, group that was pre dosed with the ethanolic extract of leaves of *Sida cordifolia* showed a considerable degree of antiulcer activity in comparison to positive controlled treated group. The antiulcer activity was appraised by determining and comparing the ulcer index in the test drug groups with that of the control group as well as Famotidine (20mg/kg) was used as reference drug. The results revealed significant antiulcer activity by reducing the ulcer index in the above model. The results obtained were verified with one way ANOVA followed by Schiff's (multiple range test) and found to be significant at ($p<0.001$).

Keywords: Pylorus, Aspirin, Ethanolic extract, Famotidine, *Sida cordifolia*.

INTRODUCTION

Peptic ulcer is an inflamed break in the lining of the stomach or the duodenum caused due to either increased acid production or damage to the mucus lining of the stomach. In most conditions the event of peptic ulcer is due to an imbalance taking place because of increased hydrochloric acid secretion and decreased cytoprotective activity of the mucosal barrier[1] . The patho physiology of PUD involves an imbalance between offensive (acid, pepsin & *Helicobacter Pylori*) and defensive factors (mucin, prostaglandin, bicarbonate, nitric oxide & growth factors)[2]. Herbal medicines for the treatment or prevention of digestive disorders[3]. Numerous plants herbs are used to treat gastrointestinal disorders in traditional medicine. There has been renewed interest in identifying new antiulcer drugs from natural sources.[4]

Sida cordifolia an erect, perennial under shrub (or) shrub, 1.5m. High, distributed throughout the hotter parks of India and Nepal. This species is not only important as a medicine, but also yield a good fiber. Leaves are considered to possess demulcent and diuretic properties and are used in rheumatic affections. They are smeared with gingerly oil and applied to suppurate ulcers. The juice of the leaves is boiled in oil and applied to testicular swellings and in elephantiasis. In the Philippines, leaves are employed for making poultices for sores. In Africa leaves are used as an abortifacient. Decoction of the leaves and root is credited with emollient and tonic properties leaf juice is given for relief in chest pain and as an anthelmintic[5].

MATERIAL AND METHODS

Experimental animals

The study was conducted on Wister albino rats weighing 178.79± 9.35 g of either sex and maintained under standard environmental conditions as per a specific design (10% air exhaust in air conditioning unit was maintained along with a relative humidity of 60 ± 5 % and a temp of 25±3^0) with 12 hrs light and dark cycle. The animals were deprived of food for 36hrs but water was provided ad *libitum* to experimental animals. All experimental protocols were reviewed and accepted by the Institutional Animals Ethics Committee (IAEC) No: 265/ CPCSEA prior to the initiation of the experiment.

Preparation of plant extract

The leaves of *Sida cordifolia* was collected from the various localities of Trichy and authenticated. The collected plant materials were cleaned, shade dried and powdered. The coarse powders were extracted with ethanol (90% v/v) in Soxlet apparatus. The crude ethanolic extracts obtained were concentrated under vacuum with controlled temperature (40-45^{0}C) and a semisolid mass (30% w/w respective of dry starting materials) was obtained and stored in a desiccators.

Ulcer induction procedure

Gastric ulcers were induced in the experimental animals by Pylorus ligation, and administration of Aspirin (300mg/kg), Ethanol (1ml/kg). For pharmacological investigation animals were divided in to 4 groups, 6 animals each. (Group -I to Group -IV). 36 hrs fasted animals were used. Group I-served as control which received calculated dose of 0.2% agar. Group II & III was dosed with test extract 100 mg/kg, 200 mg/kg and 0.2% agar respectively at least 30 min prior the procedure to be carried out for ulcer induction. Group -IV acted as standard or reference which received Famotidine (20mg/kg). Throughout the experiments water was provided by *ad libitum* and food was withdrawn from animals.

Aspirin Plus Pylorus ligation treatment induced ulcers

Both aspirin treatments as well as pylorus ligation procedure was used to induce peptic ulcers. All the animals received drug/ extract treatment along with 300 mg/kg of aspirin suspended in 0.2% agar once daily for five days. On the sixth day the 36 hrs fasted rats were subjected to pylorus ligation. They were sacrificed after 4hrs of post surgery and their intact stomachs were excised, observed and the contents were emptied in to a graduated centrifuge. The collected gastric juice was centrifuged at 3000rpm for 30 min and the volume of gastric juice was measured. Total acidity in the supernatants was determined with 0.01M Sodium hydroxide and expressed as milli equilent / ml gastric juice. The stomach was cut open along the greater curvature and pinned on a soft board for ulcer scoring[6].

Aspirin induced ulcers

The animals were received with aspirin suspended in 0.2% agar (300mg/kg body weight). The animals were then left as such for 4hrs after which were sacrificed. The intact stomach was removed in each animal. Washed in normal saline. The inner lining was observed for ulcer formation and ulcers were scored to obtain the ulcer index[7].

Ethanol induced ulcers

Animals were orally administrated with 1 ml of 80% ethanol each and then were left as such for 4hrs. The animals were then sacrificed and their intact stomachs were removed, observed and scored to obtain the ulcer index.

Calculation of ulcer index

The mucosal layer of stomach was observed under magnifying lens and was checked for ulcers, hemorrhagic areas perforations. The ulcer index was determined[8] as Ulcer Index = 10/X Where X= Total area of stomach mucosa / Total ulcerate area).

Statistical analysis

The results of all the assays were reported as mean ± standard deviation (S.D). Statistical significant differences between the groups were calculated by means of one way ANOVA followed by multiple range test especially Schiff's test. All the results obtained in the study were compared with the control group and positive control group Famotidine. P values <0.001 were considered statistically significant[9].

RESULT AND DISCUSSION

Aspirin plus Pylorus ligation model

The effect of plant extracts and famotidine on gastric secretory volume, pH, total and free acidity and gastric ulcers were shown in (Table 1& 2). *Sida cordifolia* was found to be effective and produced significant effect when compared with the control similar to famotidine.

Pylorus ligation the most widely used method for producing experimental peptic ulcer[10]. Pylorus ligation stimulates gastric section and thus the pathology of this experimental peptic ulcer is due to a stimulation of gastric acid secretion[11,12]. Plant extract of *Sida cordifolia* exhibited potent anti secretary and anti ulcer property in rat model. The extract reduced gastric secretory volume, acidity and ulceration similar to famotidine.

Ethanol Induced Gastric Lesion

In Ethanol induced gastric lesion, *Sida cordifolia* produced significant inhibitory action (Table 3).Gastric cyto protection is maintained by 2 types of barriers namely Gastric mucus barrier and Gastric mucosal barrier. Any agent which interrupts these barriers will result in cell damage. In this study, ethanol was used as the necrotizing agent. Ethanol induced gastric damage has been soon to be associated with depletion of gastric mucus[13] breaking of the mucosal barrier[14,15],back diffusion of acid, increased gastric mucosal permeability[16,17]leads to increasing leak of hydrogen ion from the lumen ,decrease in the transmucosal electrical potential difference[18], changes in the mucosal blood flow[19],destruction of micro vascular and nonvascular type of cells, mast cell

degranulation, neutrophill mediated mucosal injury (release of oxygen free radicals, proteases and lysosomal enzymes, digestion of proteins and lipid per oxidation in cell membrane)[20] and depletion of certain oxygen free radical scavenger. Thus it might be anticipated that the extract may interfere in any of the pathogenic process and afford and production against Ethanol induced gastric lesions.

DISCUSSION

The normal control exhibited very severe ulceration especially in Aspirin plus pylorus and aspirin. Hence it may be inferred that aspirin proved to be most potent in gastric ulcer induction. In the aspirin(300mg/kg) plus pylorus ligation model the statistical data 100mg/kg shows significant when compared to famotidine group, which in turn indicates that the group has get equal activity as that of famotidine. The group 200mg / kg showed significant activity with famotidine which is an indicative of better activity than famotidine group. In the ethanol model the statistical data 100mg/kg shows significant when compared to famotidine group.

Thus in this present study the ethanolic extract of *Sida cordifolia* was established for its significant antiulcer activity against different ulcer causing agent used in all three ulcer inducing experimental models.

Though authors have not studied the active principles responsible for the antiulcer activity of *Sida cordifolia* is likely that flavonoids compounds tannins, steroids and triterpenoids present in *Sida cordifolia* may be involved in this action as flavonoids have been reported to possess significant antiulcer activity in various experimental models of gastric and duodenal ulceration[21]. However further studies are entitled to establish its exact mode of action and the active principles involved in its antiulcer effect.

Table 1: Effect of Plant extract in Aspirin plus pylorus legation (Mean ± S.E, n=6)

S. No	Group	Gastric secretory volume(ml)	pH	Total acidity m.Eq /l	Free acidity m.Eq /l	Ulcer Index
1.	Control	1.8±0.04	1.3±0.01	98±7.3	77±6.3	35.4±3.2
2.	*Sida cordifolia* (100mg/kg)	0.90 ±0.08	1.8±0.11	68±3.2	51±2.1	28.8±3.1
3.	*Sida cordifolia* (200mg/kg)	0.83±0.08	2.5±0.09	51±2.6	38±0.7	20.5±0.09
4.	Famotidine (20mg/kg)	0.50±0.02*	4.10±0.18*	29±1.0*	16±0.9*	10.5±0.8*

Data are expressed as mean ± S.E, n=6
*P>0.001Vs control by student's t-test

Table 2: Effect of plant extracts on aspirin induced Gastric Ulcer in Rats (Mean ± S.E, n=6)

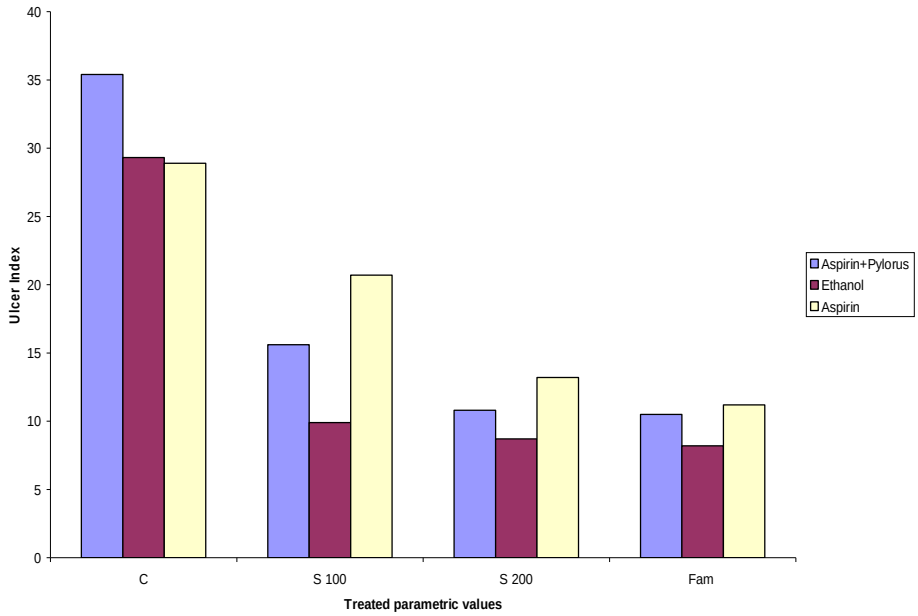
S. No	Group	Dose(mg/kg)	Ulcer Index
1.	Control	-	28.9±2.3
2.	*Sida cordifolia* extract	100	20.7±0.97
3.	*Sida cordifolia* extract	200	13.2±0.62*
4.	Famotidine	20	11.2±0.8*

Data are expressed as mean ± S.E, n=6
*P>0.001Vs control by student's t-test

Table 3: Inhibitory effect of Plant extract on ethanol Induced Gastric lesions in rats

S. No	Group	Dose(mg/kg)	Mean length of gastric lesions(mm)
1.	Control	-	29.32±1.9*
2.	*Sida cordifolia* extract	100	9.9±0.41*
3.	*Sida cordifolia* extract	200	8.7±0.54*
4.	Famotidine	20	8.2±0.51*

Data are expressed as mean ± S.E, n=6
*P>0.001Vs control by student's t-test



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