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EVALUATION OF *ABROMA AUGUSTA EXTRACT* AS ANTIULCER

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Abstract

The present study was aimed at investigating the possible antiulcer effect of ethanolic extract of Abroma augusta Linn. flower (EEAA) in variability-induced ulcer models. The results illustrated that treatment of EEAA at the dose of 200 mg/kg and 400 mg/kg twice daily for seven days to the stress-induced rats showed a significant ulcer-protective effect, which is evidenced by decreased ulcer index and increased percentage of ulcer healing. In addition, EEAA decreased the acid-pepsin secretion in vitro with an IC(50) of 150 microg/mL and markedly enhanced mucin and GAGs production that are important factors for protection and repair of the mucosa. HPTLC analysis and scintiscanning studies were also performed to establish the fingerprint of the EEAA.. The present study therefore indicated that an ethanolic extract of A. augusta flower may possess mucous/mucosal defensive effects and hence it can be used effectively in protecting the gastric mucosa from ulcers, without interfering with gastric acid secretion.

Using pylorus ligation and indomethacininduced ulcer models, the antiulcer potential was assessed a t two dosage levels (200 and 400 mg/kg). The pretreatment with the aqueous and ethanolic extract re sulted in a considerable reduction in the stomach volume, total, and free acid strength, according to t he data. Nevertheless, the gastric juice's pH only rose when the dosage was raised to 400 mg/kg

Keywords *Abroma augusta*, pylorus ligation, indomethacin, anti-ulcer

Introduction

To prevent recurrence, ulcer patients with H. pylori infection, also antigen-positive in the area of European Society of Gastrointestinal Endoscopy, through the activity of "H. pylori gastritis" and the "low recurrence rate of peptic disease in H. pylori-negative ulcers". H. pylori infection testing and treatment are important in respect of patient care and because of the risk for developing cancer in later life. Braysco's study found that infection is premonvalent and there is an increasing level of infections occurring in childhood and adolescence with age in respect to the increasing level of infection.

Type A (fundal type) generally occurs through gastric ulcer, and Type D occurs through the stomach and antrum. It is about 95% caused by most commonly without bleeding findings in

endoscopy. Peptic ulcer complications can be recognized, such as gastrointestinal bleeding or perforation, etc. When present as an emergency, the demand for diagnosis and treatment increases. The recurrence rate is also not negligible in peptic ulcer disease. Such disorders are included as speculative pathology and illness because of psychological factors (also known as a psychosomatic illness).

Gastric ulcer is the most common ailment of the gastrointestinal tract. Its primary lesions can involve both the stomach and duodenum. Gastritis is one type of gastric ulcer. Such types of diseases are known as peptic ulcers. Peptic ulcer is the most common gastroduodenal disease. Only half of the individuals with peptic ulcer have symptoms and only 15-20% of the individuals' symptoms have bleeding. The disease is equally common in men and women. However, the opposite ratio is seen in children. Ulcer is generally seen in the age of 30-40 years. This disorder increases in incidence during periods of war. Stomach ulcers are generally found in the lesser curvature of the pyloric end of the stomach, which directly contacts with acid-related peptic issues. Duodenal ulcers mainly occur in the anterior wall below the absorptive zone where the duodenum is connected with the stomach and liver.

1.2 Background and Rationale

Since there is insufficient information on the anti-inflammatory responses of Ac extract, the present study aims to estimate the anti-inflammatory action of the flower of Abroma Augusta Linn against ethanol-induced mucosal wounds in rats.

The effectiveness of Abroma Augusta Linn in the experimental treatment of chronic gastric ulcer, caused by ethanol and aspirin, has been previously studied. The antiulcer effect of methanolic extracts from the leaves and seeds of this plant has also been observed. It has also been found to increase the levels of offensive stress in the rat stomach. The extracts also increase gastric wall mucus secretion. Researchers have also evaluated the antiulcer property of the chloroform part of Abroma Augusta Linn. The leaf extract has been found to prevent xenobiotic-$CaCl_2$ induced (chloride ion-mediated) gastric lesions, partially through an opioidergic mode of control.

Traditionally, people, especially the lay people, often deviate their attention from healthcare due to various reasons. As far as lay people are concerned, they usually rely on medicinal plants. Although conventional therapies for most illnesses are now available through modern medications and surgical interventions, the desire for achieving good health remains fueled by the benefits of plant drugs.

2.0 Material and Methods

2.1 Preparation of Extracts

Preparation of methanolic extract: 50 gm of powdered flowers of Abroma Augusta Linn were taken in a soxhlet extraction apparatus. 200 ml of methanol was added to the powder of Abroma Augusta Linn in the soxhlet apparatus and refluxed for 48 hours. After the extraction was over, the solvent was removed in a vacuum desiccator. The resultant extract was collected, weighed, and stored in an airtight container for future use and experimentation.Preparation of flower powder of Abroma Augusta Linn: 100 gm of Abroma Augusta Linn flowers were cleaned, dried in the oven at 55° for 2-3 hours.

2.2 Plant Collection and Identification

The leaves were found to heal ulcers, and hence we wanted to analyze if the flower could also be added to this list.

The Birbal Sahni Institute of Palaeobotany, Lucknow, Uttar Pradesh, provided the crude drug's authentication (Reg. No. 13374).Approximately six trees of similar age group were used, and flowers were collected during the month of March-April 2006. The fresh flowers were collected on a daily basis for a week. The flowers were shade dried and ground to fine powder. Organoleptic characters and fluorescent analysis were carried out so as to identify these collected materials.

2.3 Preparation of Extracts

From 1g of dried powdered flowers, two extracts are prepared. One extract is prepared using absolute alcohol and the other is prepared using distilled water. 10 ml of absolute alcohol is added to the dried powdered flower in a conical flask and heated with the help of a water bath. The flower is extracted for 10 minutes to 5 hours to ensure sufficient extraction with alcohol. The extract is further heated using a rotary evaporator until it becomes dry. The procedure is

carried out in triplicates. Distilled water is added to the dried powdered flower in a conical flask and heated using a water bath to ensure sufficient extraction with water. Then the extract is filtered to remove unwanted residues. The filtrate is collected and stored in a covered container to prevent evaporation by sunlight. The filtrate is refrigerated at 5°C until use. This procedure is carried out in triplicates.

Crude extracts are made by using different types of solvents such as water and organic solvents like absolute alcohol, methanol, and ethanol. The dried powdered flowers (extract) are used for the preparation of the extracts. They are converted into a fine powder using a laboratory mill. The dried powdered flower is weighed, and absolute alcohol is added to it in a ratio of 1:10. The mixture is heated on a water bath until all the plant substances are extracted. The mixture is then filtered and the residue is extracted once again. The filtrate is evaporated using a rotary evaporator until the extract becomes dry. This procedure is done in triplicates. When the filtrate is dry, it is stored in an airtight container and refrigerated.

3 EXPERIMENTAL ANIMALS

Albino man For the experiment, Wistar rats weighing 150–230 g and mice weighing 25–
30 g were used. The experimental procedure has been approved by the Institutional Animal Ethi cs Committee (IAEC). In an animal home authorized by the Committee for the Purpose of Cont rol and Supervision of Experiments on Animals (CPCSEA), animals were kept in normal circu mstances. Following the acquisition of the animals housed under the following typical husbandr y conditions:
Room temperature: 26 ± 2^0
Relative humidity: 45 - 55%
Light/dark cycle: 12 h

ACUTE TOXICITY

Birari et al. (2010) conducted the acute oral toxicity research in accordance with the Organizatio n for Economic Cooperation and Development's (OECD) recommendations. By giving the extra cts to healthy adult Wistar albino rats of either sex or at increasing doses of 1, 2, 3, 4, and 5

g/kg body weight orally, the median fatal dosage of the pet ether, alcohol, and aqueous extracts was determined. Because all of the extract was determined to be safe at doses up to 400 mg/kg body weight, the dosage levels of 200 and 400 mg/kg body weight were chosen for the current investigation.

5 ANTI-ULCER ACTIVITY

Gastric ulcers were induced in the different groups of rats (treated and untreated groups) by foll owing methods:

Indomethacin- Induced Ulcer Model

Six sets of albino rats, weighing between 120 and 200 g, were used in the investigation. The co ntrol, standard, AAE, AAE 400, AEE 200, and AEE 400 groups were split up. Food was stoppe d 24 hours before to the trial, and 30 minutes before the Indomethacin challenge, the test medic ations were taken orally. After four hours, the animals were killed with a large dosage of diethyl ether, and the ulcer index and ulcer score were measured after the animals' stomachs were open ed. Ranitidine (50 mg/kg) caused an inhibition of 93.29 percentages,
whereas the aqueous extract at dosages of 200 and 400 mg/kg considerably reduced the ulcerog enic action of indomethacin by 74.39 and 88.41 percentages. In contrast to the extract and raniti dine, which did not significantly lower the ulcer score or index, the control animals' ulcer score and ulcer index shown a considerable decrease in a dose-
dependent manner. The research offers insightful information on how aqueous extracts may be used to heal ulcers.

Table 1: Evaluation of gastroprotective potential of *Abroma augusta* extracts by indometha cin-induced ulcer model

Sr. No.	Treatment	Dose (mg/kg)	N Ulcerat ed	Ulcer Score	Ulcer Index	% Protecti on
1.	**Control**	1 mL/animal	6/6	9.83±0.76	1.64±0.13	-
2.	**AAE**	200	6/6	5.50±1.32*	0.92±0.22*	43.90
3.	**AAE**	400	6/6	1.83±0.21**	0.31±0.04**	81.09
4.	**AEE**	200	6/6	2.50±0.37**	0.42±0.06**	74.39
5.	**AEE**	400	5/6	1.17±0.25**	0.19±0.04**	88.41
6.	**Ranitidine**	50	5/6	0.67±0.17**	0.11±0.03**	93.29

All values are Mean±SEM for 6 rats, Statistical comparison was performed by Graph pad prism software using ANOVA followed by Dunnett's test, $^{**}P<0.01$, $^{*}P<0.05$ when all compared with the control group.

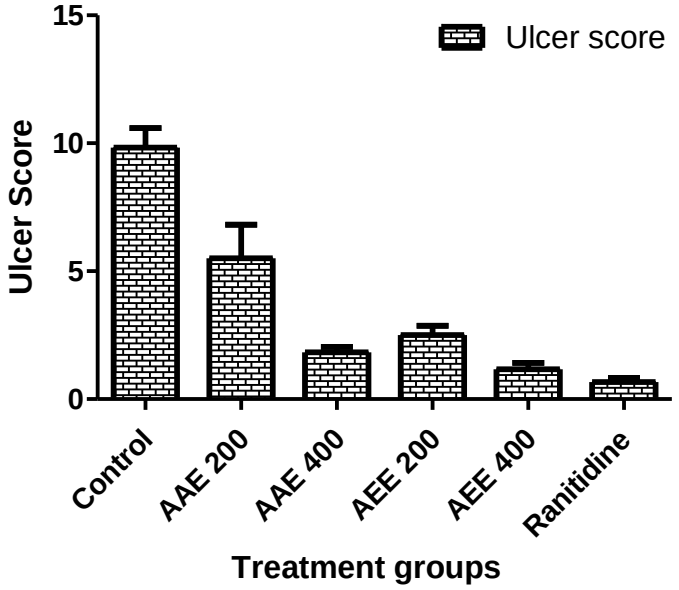


Fig 1: Evaluation of ulcer score of extracts by indomethacin-induced ulcer model

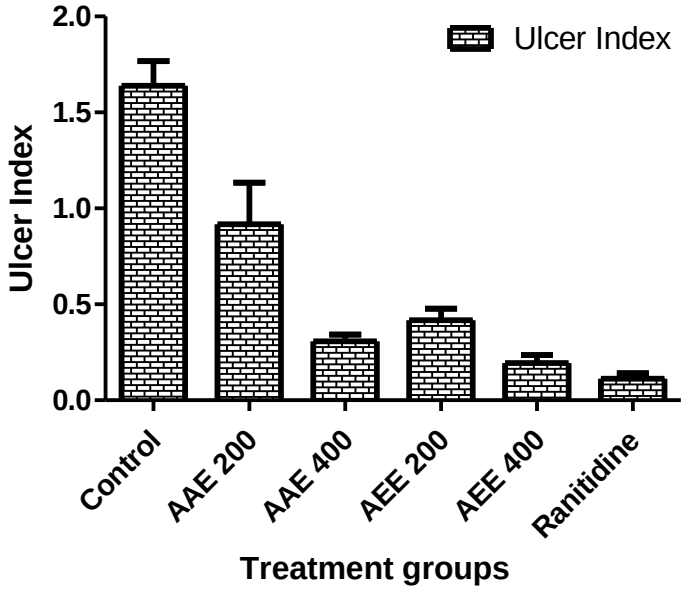
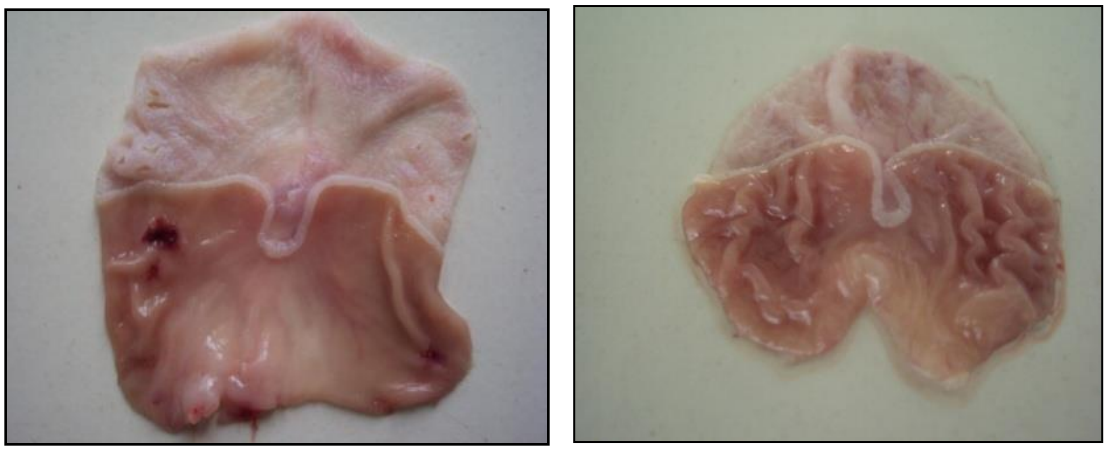
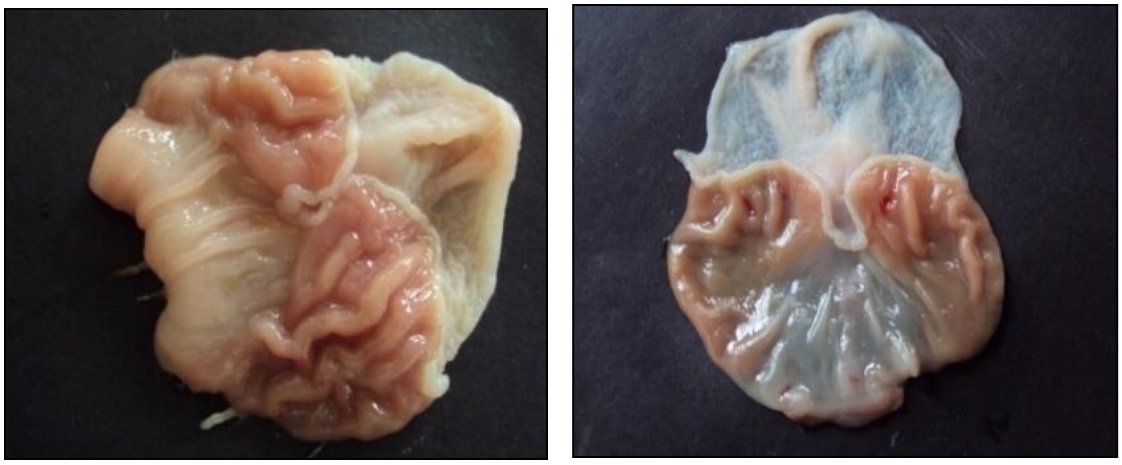


Fig 2: Evaluation of ulcer index of extracts by indomethacin-induced ulcer model



(A) (B)



(C) (D)

Fig 3: Macroscopical view of stomach of indomethacin-induced ulcer model (A) Control **(B)** Standard **(C)** AEE **(D)** AAE

5.2 Pylorus Ligation-Induced Ulcer Model

Male albino Wistar rats were used in the investigation, and they were split into six groups: Cont rol, Standard, AAE, AAE 400, AEE 200, and AEE 400. To prevent coprophagy, the rats were f asted for a whole day in their separate cages. Thirty minutes before to pyloric ligation, a conven tional medication and an aqueous and ethanolic floral extract were given. Pentobarbitone was us ed to numb the animals, and they were then sutured. The animals were slain with extra anestheti c ether after four hours, and their stomachs were opened to release the gastric fluid. The gastric juice was collected, emptied, and placed in test tubes. The juice was then centrifuged for 30 min utes at 3000 rpm, and its pH was noted. After that, the contents' free and total acid strength wer e examined. Running water was used to wash the stomachs in order to check for ulcers in the gl andular section of the stomach. The number of ulcers on each stomach was recorded, and using a hand lens (10x), the ulcers' severity was microscopically assessed.

The ulcer scoring done as below

Normal stomach.....0

Red coloration.....0.5

Spot ulcer.....1.0

Hemorrhagic streak.....1.5

Ulcers.....2.0

Perforation.....3.0

Mean ulcer score for each animal will be expressed as ulcer index.

Calculation of ulcer index According to Gupta *et al.,* (2012)

$UI = (UN+US+UP) \times 10^{-1}$

UI = Ulcer index

UN = Average of number of ulcer per animal

US = Average of severity score

UP = Percentage of animal with ulcer

The percentage protection was calculated using the formula According to Baggio *et al.,* (2007)

$$\text{Percentage protection} = \left(1 - \frac{Ut}{Uc}\right) \times 100$$

Where Ut = Ulcer index of treated group

Uc = Ulcer index of control group.

5.3 Determination of Free acid and Total acid Strength

Gupta et al. (2010) and Malairajan et al. (2007) provided the technique used to measure the fre e acid strength and total acid strength. Using a pipette, one milliliter of gastric juice was transfe rred into a 100 milliliter conical flask. Next, two to three drops of Topfer's reagent (dimethyla minoazobenzene) were added, and 0.01 N sodium hydroxide was titrated until the solution's col or changed from red to yellowish orange. It was observed how much alkali was applied. This v olume is indicative of free acid. After adding two to three drops of phenolphthalein solution, th e titration was carried out until a distinct red tint was once again visible. Once again, the total a

mount of alkali added was recorded. The volume and total acid match.

The formula was used to determine the acid's strength.

$$\text{Strength of Acid} = \left(\frac{\text{Volume of NaOH x Normality of NaOH x 100}}{0.1} \right) \text{mEq/L}$$

Determination of Gastric Volume and pH

Following pyloric ligation, the gastric juice was centrifuged for one hour at 3000 rpm, and the v olume was determined using a pipette. A digital pH meter was used to test the pH of the solutio n after 1 mL of gastric juice was diluted with 1 mL of distilled water.

The outcomes of pylorus ligation-

induced stomach mucosal ulceration are shown in Tables 3.7 and 3.8. Rats in the control group had lesions or elevated inflammations after undergoing pyloric ligation. In a control group, the p yloric ligation resulted in an accumulation of gastric secretions measuring 1.47±0.15 mL and p H 2.17±0.50. The results showed that the gastric secretion's free acid and total acid were, respec tively, 92.33±7.26 and 169.33±17.47 mEq/L. Pretreatment at a dosage of 200 and 400 mg/kg of the aqueous and ethanolic extract of Abroma augusta flower substantially (*P<0.05) decreased t he amount of gastric secretion and raised the pH of the gastric juice. Furthermore, there was a d ose-

dependent substantial (**P<0.01) reduction in both total and free acid. Additionally, it was note d that, in comparison to the control group (3.00±0.21, 18.00±1.28), the ulcer index and ulcer sc ore of the extracts treated and standard were also considerably (**P<0.01) decreased.

Table 2: Evaluation of Anti-ulcer potential of *Abroma augusta* extracts by pylorus ligation-induced ulcer model

Sr. No.	Treatment	Dose (m g/kg)	pH	Volume (m L)	Free Acid (m Eq/L)	Total acid (m Eq/L)
1.	**Control**	1mL	2.17±0.50	1.47±0.15	92.33±7.26	169.33±17.47
2.	**AAE**	200	2.97±0.49	1.20±0.17	93.00±1.00	128.67±2.19*
3.	**AAE**	400	3.23±0.26	0.83±0.20	48.33±2.40**	95.00±6.35**

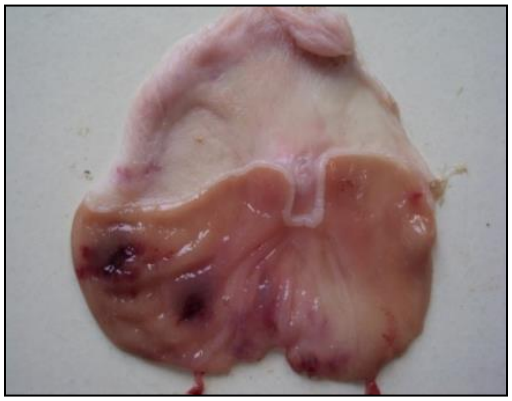
4.	**AEE**	200	3.40±0.29*	0.90±0.12	82.67±4.70	130.33±11.79
5.	**AEE**	400	3.73±0.17*	0.96±0.17	64.67±7.26*	96.33±9.82**
6.	**Omeprazole**	30	4.41±0.29**	0.48±0.07**	58.00±7.81**	90.33±1.67**

All values are Mean±SEM for 6 rats, Statistical comparison was performed by Graph pad prism software using ANOVA followed by Dunnett's test, **P<0.01, *P<0.05 when all compared with the control group.

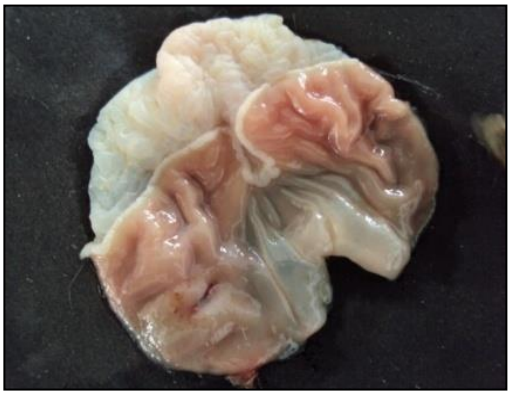
Table 3: Evaluation of Anti-ulcer potential of *Abroma augusta* extracts by pylorus ligation-induced ulcer model

Sr. No.	Treatment	Dose (mg/kg)	Ulcer Index.	Ulcer Score.	% Protection
1.	**Control**	1 ml/animal	3.00±0.20	18.00±1.25	-
2.	**AAE**	200	1.50±0.19**	9.00±1.19**	50.00
3.	**AAE**	400	1.33±0.11**	8.00±0.66**	55.67
4.	**AEE**	200	2.16±0.03	13.00±0.18	28.00
5.	**AEE**	400	0.75±0.17**	4.50±1.02**	75.00
6.	**Omeprazole**	30	0.61±0.08**	3.67±0.45**	79.67

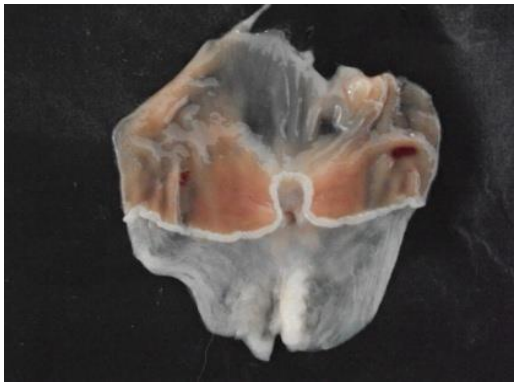
All values are Mean±SEM for 6 rats, Statistical comparison was performed by Graph pad softw are using ANOVA followed by Dunnett's test, **P<0.01, when all compared with the control gr oup.

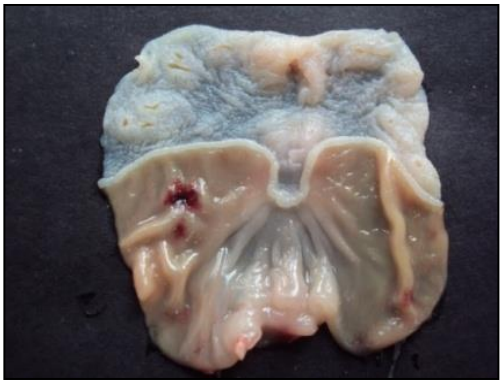


(A)



(B)





(C) **(D)**

Fig 3.9: Macroscopical view of stomach of Pylorus ligation-induced ulcer (A) Control **(B)** Standard **(C)** AEE **(D)** AAE

4. DISCUSSION

Extracts from the flowers of Abroma augusta were assessed for their behavioral activity and pos sible antiulcer properties. The findings demonstrated that although the aqueous and ethanolic ex tracts had some influence on spontaneous activity and exploratory behavior at larger dosages, it was not significant. At lower levels, the extracts had no effect on the overall behavioral profile or exploratory behavior.

The process of repairing an ulcer is genetically predetermined and involves many steps, includin g inflammation, cytologic division,Resurfacing of wound, vascularized tissue creation, new blood vessels forming from exiting vessels, matrix reaction, and tissue remodeling, all of which lead to the formation of scars. In many mammalian species, flavonoids and alkaloids shield the stomach mucosa against a range of substances that might cause ulcers. Abroma augusta flowers are abundant in alkaloids and flavonoids, both of which have antioxidant properties. The flower is also includes mucilage, which may develops a protective coating on the gastrointestinal muco sal membrane and perhaps aid in avoiding gastric lesion, according to preliminary phytochemic al screening.

As the AAOH is the most ulcer-promoting factor and contributes to the generation of free radicals mediating lipid peroxidation, the present study reveals that the anti-ulcerogenic effect of AAF is mediated by its antioxidant property, thereby inhibiting lipid peroxidation. These results show that flowers of A. Augusta Linn possess antiulcer activity and corroborate the traditional use of this plant in

ulcers. Thereby, it is hoped that this study may reflect on this plant's medicinal use. Furthermore, as ulcers are a major prevalent human disorder, our studies suggest that A. Augusta might be a good natural remedy. Although specifically tailored preclinical tests and human clinical studies are needed before compounds derived from A. Augusta can be recommended for patients with gastric ulcers, the benefit of such a future goal could be enormous in terms of potentially relieving human suffering and healthcare costs as well.

5. Conclusion and Future Directions

In the current study, Pr. P. Augusta Linn (Family: Sterculiaceae) methanolic extract significantly decreases ulcer formation, which indicates the protective effect of the flower against different experimental models of gastric ulcers. The histological observations have also supported these results. An attempt has also been made in the present investigation to isolate and identify the constituents which might be responsible for the potent antiulcer activity. To the best of our knowledge, this is the first report of the antiulcerogenic activity of Abroma Augusta Linn staminal hair. By adjusting the dose and mixture of secondary metabolites present in the extract and vesicles, it may be possible to develop a potent ideal therapeutically applicable anti-ulcer agent for clinical use.

The present study evaluates the protective effects of the methanol extract of Abroma Augusta L. (Family: Sterculiaceae) flowers against different experimental models of gastric ulcers. Significant protection against gastric lesions was observed. The protective effect was further confirmed by histopathological studies. At the tested doses, the methanol extract did not show any gross signs of toxicity. The obtained results support the view that A. Augusta L. has significant potential for use in the treatment of various diseases. Therefore, it is very important to investigate many medicinal plants belonging to this family, especially A. Augusta L. Pharmacological screening for the antiulcer activity of the flowers demonstrated that an intragastric dose-dependently decreases the severity of gastric mucosal injury.

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