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To Evaluate Preliminary Pharmacological Screening of Plant Extract of *Ficus auriculata Lour* for Anti - ulcer Activity

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Objectives: To Evaluate Preliminary Pharmacological screening of plant extract of *Ficus Auriculata Lour* for Anti - Ulcer activity.
Materials and Methods: The fresh leaves of plant *ficus auriculata* lour werecollected from the wild forest area of village Mushyoli Distt. Bageshwar (Uttarakhand), India. The identification and authentication of the plant leaf's of ficusauriculta lour (BSI/NRC/Tech./Herb.(Ident.)/2019-20/433) was done byDr S.K.Singh Research officer Botany (Scientist E) at Botanical Survey of India, (Northern regional centre, Dehradun).
Results: The results of the pyloric ligation model showed that one or more processes were responsible for the reduction in baseline gastric output, the inhibition of ulcers index, the rise in stomach capacity, and the elevation in pH of gastric fluid. The consumption of alcoholic beverages has been shown to significantly increase the levels of reduced glutathione (GSH), while the consumption of the leaves of the *Ficus auriculata* tree has been shown to significantly reduce the damage to the gastric mucosa caused by the consumption of alcoholic beverages.

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Conclusion: There was a greater reduction in the severity of ulcers in patients who took the ethanolic extract of *Ficus auriculata*. Treatment with an ethanolic extract of Ficus lour leaves at dosages of 200 and 400mg/kg body weight exhibited statistically significant anti-ulcer action (p 0.0001) on the percent protection against the formation of ulcers in models produced by indomethacin. It displays a lowered stomach ulcer index, decreased total gastric acidity, increased total gastric volume, and increased total gastric protein, in contrast to the disease control. Additionally, it demonstrates an enhanced gastric pH. All of these data point to the possibility that the high flavonoid content is responsible for some of its anti-ulcer actions.

Keywords: Ficus auriculata; anti ulcer activity; phytochemical screening; indomethacin; ethanol.

1. INTRODUCTION

Peptic ulcer disease, often known as PUD, is a severe illness affecting the digestive system. Its causes might vary, but the disease's incidence is particularly high in India [1-3]. PUD is estimated to impact roughly 10% of the entire population of the globe. In 2019, new cases of peptic ulcer disease were discovered in around 87.4 million persons across the world. Peptic ulcer disease is responsible for the deaths of 2,67,500 people in 2020, which is a decrease from 327,000 fatalities in 2021. According to data provided by the WHO in 2021, the number of fatalities caused by peptic ulcer disease in India reached 57,658, accounting for 0.66% of all deaths. India is ranked #60 in the world according to its age-adjusted deathrate, which is 6.14 deaths per one thousand thousand people. In the year 1670, Princess Henrietta of England was the patient who first provided a detailed account of a perforated peptic ulcer. In the latter part of the 20th century, researchers Barry Marshall and Robin Warren were the ones who initially identified H. pylori as the pathogen responsible for peptic ulcers. Traditionally, mucosal disruption in patients with acid peptic disease is considered tobearesult of a hypersecretory acidic environment together with dietary factors or stress. Riskfactors for developing peptic ulcer include *H. pylori* infection, alcohol and tobaccoconsumption, non-steroidal anti-inflammatory drugs (NSAIDs) use and Zollinger–Ellisonsyndrome [4,5]. The main risk factors for both gastric and duodenal ulcers are H. pylori infection and NSAID use. However, only a small proportion of people affected withH. pylori or using NSAIDs develop peptic ulcer disease, meaning that individual susceptibility is important at the beginning of mucosal damage. Functional polymorphisms in different cytokine genes are associated with peptic ulcers [6-8]. For example, polymorphisms of interleukin 1 beta (IL1B) affect mucosal interleukin 1β production, causing H. pylori-associated gastroduodenal diseases. One of the most common causes of peptic ulcer disease is *H. pylori*, almost half of theworld's population is colonized by H. pylori. The prevalence of risk factor of H.Pylori caused gastric ulcer is higher in developing countries like Africa, Central Asia, Central America, Eastern Europe and other countries with lower socioeconomic status [9-12]. *H. pylori* mainly causes epithelial cell line degeneration and injury, which is more severe intheantrum portion of the stomach. The main mediators of H. pylori infection are cytokines(CCK) that inhibit parietal cell secretion, but H. pylori can directly affect the H+ /K+ ATPase α-subunit, activate calcitonin gene-related peptide (CGRP) sensory neuronslinked to somatostatin, or inhibit the production of gastrin [13-15]. Increased level of gastrinmakes the stomach more acidic or lead to cause peptic ulcer. The majority of gastric ulcer patient is associated with hypochlorhydria and mucosal atrophy.

2. MATERIALS AND METHODS

2.1 Plant Material

The fresh leaves of plant *ficus auriculata* lour werecollected from the wild forest area of village Mushyoli Distt. Bageshwar (Uttarakhand), India. The identification and authentication of the plant leaf's of ficusauriculta lour (BSI/NRC/Tech./ Herb.(Ident.)/2019-20/433) was done by Dr S.K.Singh Research officer Botany (Scientist E) at Botanical Survey of India, (Northern regional centre, Dehradun).

2.2 Phytochemical Screening

The leaves extract of *Ficus auriculata lour* were subjected to qualitative analysis for the various Phyto-constituents like. fatty acids, terpenoids, steroids, alkaloids, flavonoid, carbohydrates, phytosterols, protein, amino acid etc.

2.3 Animals

The Wistar rats that ranged in weight from 250 to 300 g were donated by the animal house on the

Sir J.C. Bose Technical Campus, where they were kept under standard circumstances. They were given water as well as a meal appropriate for rodents. In accordance with the guidelines established by CPCSEA, the Institutional Animal Ethical Committee granted approval for the study. A light-dark cycle of twelve hours has been chosen to regulate the relative humidity, temperature, and lighting of the space. The animals were kept in cages made of polypropylene cylinders and provided with access to food, water, and clean rice husk bedding. The animals' housing was also kept clean. water that has been filtered and cleansed. Through the use of a separate needle that was connected to a syringe of the proper calibre, a single oral dose of the substance being tested was administered to each rat. The amount of the test drug that was given to each rat was dependent on the animal's weight on the day when the administration of the chemical was performed.

Table 1. Evaluation of anti-ulcer activity

Pylorus ligation induced ulcer model			
Group No.	**Treatment**	**Dose mg/kg**	**Parameter**
A	Disease Control (0.9% Nacl Solu.)	0.5 ml	1. pH
B	Standard (Ethanol 80%v/v)	80%	2. Ulcer Index 3. Gastric Volume
C	Low Dose (Ethanolic Extract)	200 mg/kg Body weight	4. Total Acidity
D	High Dose (Ethanolic Extract)	400 mg/kg Body weight	5. Ulcer Score **6.** Total Protein
Indomethacin induced ulcer model			
Group No.	**Treatment**	**Dose mg/kg**	**Parameter**
A	Disease Control (0.9% Nacl Solu.)	0.5 ml	1. pH
B	Standard (Ethanol 80%v/v)	80%	2. Ulcer Index 3. Gastric Volume
C	Low Dose (Ethanolic Extract)	200 mg/kg Body weight	4. Total Acidity 5. Ulcer Score
D	High Dose (Ethanolic Extract)	400 mg/kg Body weight	**6.** Total Protein
Ethanol induced ulcer model			
Group No.	**Treatment**	**Dose mg/kg**	**Parameter**
A	Disease Control (0.9% Nacl Solu.)	0.5 ml	1. pH
B	Standard (Ethanol 80%v/v)	80%	2. Ulcer Index 3. Gastric Volume
C	Low Dose (Ethanolic Extract)	200 mg/kg Body weight	4. Total Acidity 5. Ulcer Score
D	High Dose (Ethanolic Extract)	400 mg/kg Body weight	6. Total Protein

Table 2. Phytochemical constituents present in ethanolic extract of *Ficus auriculata*

Sr./no.	**PhytochemicalInvestigation**	**Chemical test performed**	**Ethanol extract**
1.	Tannins	Ferric chloride test	+ve
		Lead acetate test	+ve
		Bromine water test	+ve
		Iodine test	+ve
		Gelatin test	+ve
		Acetic acid test	+ve
		Potassium di chromate test	+ve
		Potassium Permagnet Test	-ve

Sr./no.	PhytochemicalInvestigation	Chemical test performed	Ethanol extract
		Dil. Nitric Acid Test	+ve
2.	Flavonoids	Shinoda test	+ve
		Sulphuric acid test	+ve
		Lead acetate test	+ve
		Sodium hydroxide test	+ve
		With Zinc and HCL	+ve
3.	Alkaloids	Dragendroff's test	+ve
		Mayers's test	+ve
		Hager's test	+ve
		Wagner's test	+ve
		Tannic acid test	+ve
4.	Glycosides	Baljet's test	+ve
		Legal's test	-ve
		Killer-killiani test	-ve
		Bontrager test	-ve
5.	Carbohydrates	Fehling's test	+ve
		Benedict's test	+ve
		Barfoeds's test	-ve
		Molish's test	+ve
		Tannic acid test	-ve
		Iodine test	-ve
6.	Steroids	Salkowski test	+ve
7.	Saponins	Foam Test	+ve
8.	Proteins	Biuret test	+ve
		Xantho protein test	+ve
9.	Amino acid	Tyrosine test	+ve

3. RESULTS AND DISCUSSION

The plant *Ficus auriculata* Lour. was harvested, authenticated, and its leaves were air dried for 40 days at room temperature. For 72 hours, ethanol (70 percent v/v) was extracted from 500 grammes of powdered leaves using a Soxhlet device and an electric mixer. Vacuum evaporation at 5-6 rpm and 40 °C was used to remove the solvent.

3.1 Pylorus Ligation Induced Ulcer Model

The effect of *Ficus auriculta lour* on pylorus ligation induced gastric ulcer is given in Table 3 and Fig. 1, pylorus ligation induced gastric ulcer in normal disease control animal was evidenced by the ulcer index (U.I) is 10.783±0.064, high gastric acid volume 8.5±0.258, low pH 1.895±0.029, high total acidity 87.041±0.244 and high total protein 0.776 ± 0.031.

When ethanol extract of *Ficus auriculata lour* was given at two dose level like low dose level 200 mg/kg body weight and high dose level 400mg/kg body weight caused a significant reversal of all the above parameter when compared to control rats indicating its a potent anti-ulcer activity.

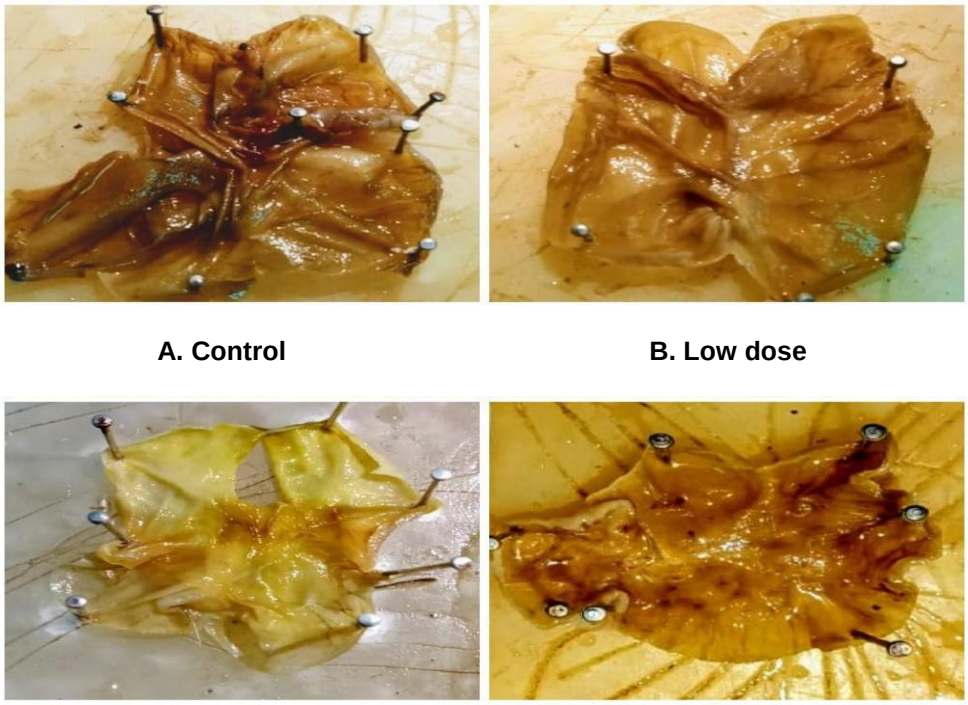
3.2 Indomethacin Induced Gastric Ulcer

The effect of *Ficus auriculta lour* on Indomethacin induced gastric ulcer is given in Table 4 and Fig. 2. Indomethacin (30mg/kg body weight) induced ulcer in normal disease control animal was evidenced by the ulcer index (U.I) 10.966 ± 0.017, high gastric volume7.5± 0.316, low pH 2.186 ± 0.076, high total acidity 91.646 ±0.493 and high total protein 0.796 ± 0.020.When ethanol extract of *Ficus auriculata lour* was given along with Indomethacin (30mg/kg body weight) at a low dose level of 200 mg/kg body weight and high dose level of 400mg/kg body weight caused a significant reversal of all the above parameter when compared to normal disease control rats indicating its a potent anti-ulcer activity.

3.3 Ethanol Induced Ulcer Model

The effect of *Ficus auriculta lour* on Indomethacin induced gastric ulcer is given in Table 5 and Fig. 3. Indomethacin (30mg/kg body weight) induced ulcer in normal disease control animal was evidenced by the ulcer index (U.I) 10.966 ± 0.017, high gastric volume7.5± 0.316, low pH 2.186 ± 0.076, high total acidity 91.646 ± 0.493 and high total protein 0.796 ±

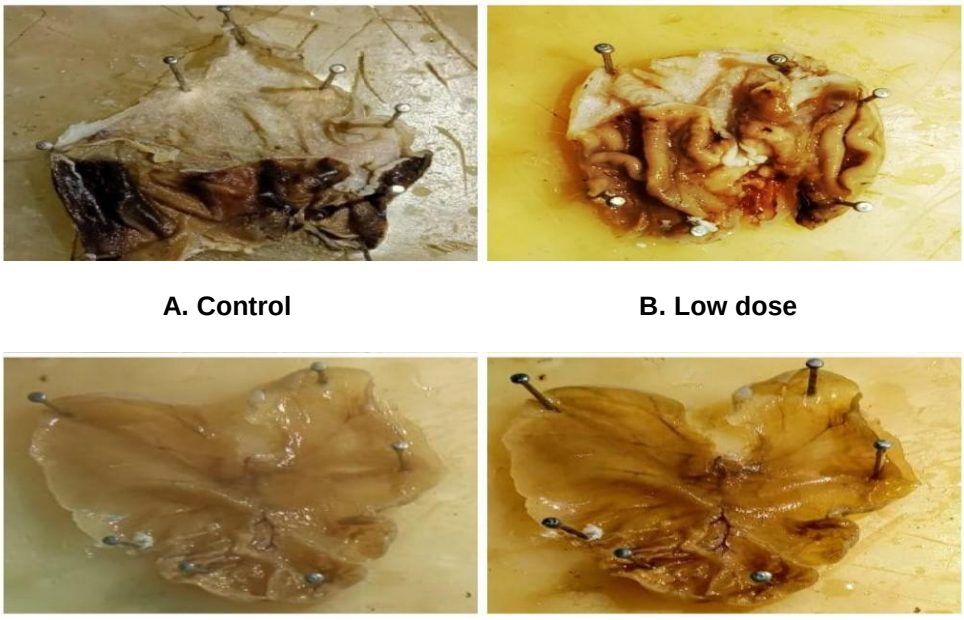
0.020.When ethanol extract of *Ficus auriculata lour* was given along with Indomethacin (30mg/kg body weight) at a low dose level of 200 mg/kg body weight and high dose level of 400mg/kg body weight caused a significant reversal of all the above parameter when compared to normal disease control rats indicating its a potent anti-ulcer activity.



A. Control **B. Low dose**

C. Standarad **D. High dose**

Fig. 1. Stomach of different groups of rats showing gastric ulcer induced by Pylorous Ligation



A. Control **B. Low dose**

C. Standard dose **D. High dose**

Fig. 2. Stomach of different groups of rats showing gastric ulcer induced by Indomethacin

Table 3. Effect of *F. auriculata lour* on ethanol induced gastric ulcer

Treatment	Dose	pH	U.I	G.V	T.A	T.P
Disease control	---	1.895±0.02997	10.78±0.06413	8.500±0.2582	87.04±0.2441	0.7767±0.03169
Standared	20	4.245±0.1793	3.88±0.03005	2.650±0.1784	45.17±0.4859	0.5750±0.02045
Low Dose	200	3.825±0.09811***	6.985±0.1257***	4.950±0.07188***	64.07±0.5762****	0.7433±0.01687
High Dose	400	4.218±0.1009****	5.158±0.07236***	3.433±0.1476***	53.16±0.7146****	0.6183±0.01956***

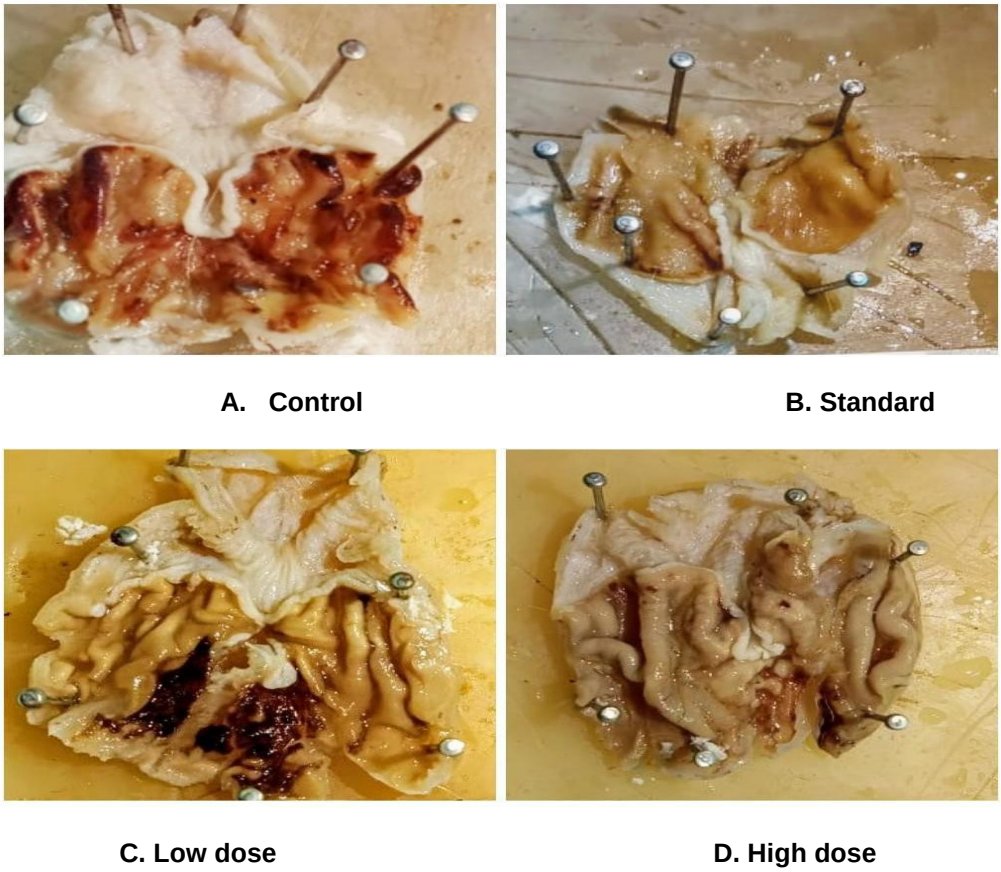
Table 4. Percentage ulcer inhibition on Indomethacin induced gastric ulcer

Treatment	Dose	pH	U.I	G.V	T.A	T.P
Disease control	----	2.187±0.0761	10.97±0.0714	7.50±0.3162	91.65±0.4938	0.7617±0.02023
Standard	20	4.935±0.0621	3.388±0.0300	2.500±0.1506	41.45±0.3922	0.5767±0.01764
Low Dose	200	3.892±0.155****	6.993±0.1014****	4.438±0.1581***	64.12±0.3517****	0.7517±0.01815
High Dose	400	4.380±0.122****	5.217±0.1038****	3.523±0.1651****	58.74±0.5582****	0.6017±0.01447***

Table 5. Effect of *F. auriculata lour* on ethanol induced gastric ulcer

Treatment	Dose	pH	U.I	G.V	T.A	T.P
Disease control	----	1.925±0.04303	10.85±0.07528	9.333±0.2894	94.44±0.3092	0.8467±0.04544
Standared	20	4.445±0.03686	5.067±0.03073	3.733±0.1874	42.77±0.2326	0.5967±0.01229
Low Dose	200	2.992±0.0207****	8.663±0.07817****	3.867±0.08819****	65.40±0.2677****	0.7517±0.01558
High Dose	400	4.800±0.1091****	6.818±0.05974****	3.483±0.1078****	58.90±0.2842****	0.5900±0.02503****

U.I - Ulcer Index , G.V - Gastric Volume, T.A - Total Acidity, T.P - Total ProteinValues are expressed as Mean ± SEM (n = 6 rats) p<0.0001 denotes significant withrespect to the control group using one way ANOVA followed by Dunnet's Test



A. Control **B. Standard**

C. Low dose **D. High dose**

Fig. 3. Stomach of different groups of rats showing gastric ulcer induced by Ethanol

4. CONCLUSION

Peptic ulcer disease causes major morbidity and mortality globally. This disease has complex pathophysiologic mechanisms and risk factors, necessitating different pharmacological medications for prophylactic and treatment. Pharmacological medications that reduce stomach acid discharges and improve mucosal defence system reduce risk factor. NSAID-induced, ethanol-induced, and pylorus ligation-induced gastric ulcer models showed considerable anti-ulcer effectiveness at 200 and 400mg/kg body weight given orally. In numerous anti-ulcer models, omeprazole 40mg/kg body weight was utilised as a reference medication. Its ethanolic extract had stronger anti-ulcer efficacy. Pre-treatment with *Ficus auriculata* lour leaves revealed anti-ulcer activity ($p<0.0001$) in pylorus ligation, ethanol and indomethacin-induced anti-ulcer models. It reduces stomach ulcer index, total gastric acidity, total gastric volume, and total gastric protein while increasing gastric pH. All of these suggests that has anti-ulcer activity, possibly due to its flavonoid concentration.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Animal Ethic committee approval has been taken to carry out this study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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